



Westinghouse
Hanford Company

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Internal
Memo

From: Waste Management Advanced Engineering Section
Phone: 3-3985 2750E/A226/200E R2-11
Date: April 5, 1989
Subject: COST/SCHEDULE ESTIMATES FROM FLUOR DANIELS, INC.

13312-89-041

To: D. E. McKenney R2-11

cc: RPA File/LB

Attached please find a brief report summarizing the cost/schedule estimates obtained from Fluor Daniels, Inc. (Fluor) on the pretreatment facility alternatives to B Plant. The summary describes a historical sequence of requests made by Westinghouse Hanford Company along with total estimated costs for the pretreatment facilities. Four reports were received from Fluor, which are appended to the summary as attachments. The four reports represented the total package received from Fluor on the cost/schedule estimate contract.

R. P. Anantatmula

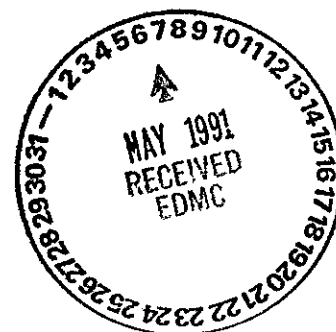
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Attachment

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COST/SCHEDULE ESTIMATES FROM FLUOR DANIELS INC.

Westinghouse Hanford Company (WHC) had requested Fluor Daniels Inc. (Fluor) to prepare cost/schedule estimates for pretreatment alternatives to B-Plant. Initially three alternatives were selected and they are the following: A new stand-alone facility, an expanded Hanford Waste Vitrification Project (HWVP) facility, and a facility colocated with HWVP. The total square footage of the stand-alone facility is 175,000 ft² with two 42,000 gallon dissolvers and the associated cesium removal and TRUEX process equipment. Fluor reviewed the layout drawings and recommended that the facility layout be modified on the basis of Fluor's experience with HWVP facility design. The modifications included such items as additional contact and remote maintenance and laydown areas, addition of a chiller room for the heating, ventilation and air conditioning (HVAC), expanded HVAC equipment rooms, addition of an off-gas system, and expansion of the cold chemical storage area. The Fluor modifications increased the area of the new stand-alone facility from 175,000 ft² to 212,000 ft². The same general modifications were also incorporated into the expanded HWVP and colocated facilities layouts.

Fluor performed total estimated cost and life cycle cost analysis for all three facilities after incorporating the modifications. The cost analysis did not include decontamination and decommissioning costs. Expense funded costs such as conceptual design, research and development, and pilot plant development were not estimated. The costs were calculated in terms of mid FY1988 dollars and escalated to the mid point of construction. The total estimated (capital) costs included detailed design, field engineering and inspection, direct construction, engineering management, construction management and project management costs. For these estimates, it has been assumed that a more significant technical demonstration and documentation step would be required in parallel with the validation step. Finally, feed supply/return lines were not included in the cost estimates.

The total estimated costs are \$787M, \$745M and \$830M for the stand-alone, the colocated and the expanded HWVP facilities respectively. The cost of the colocated facility is the least and is about 5% less than that for the stand-alone facility. The total life cycle costs, which include the operation and maintenance costs are \$254M, \$245M and \$322M respectively for the stand-alone, the colocated and the expanded HWVP facilities. The life cycle cost analyses have been performed in accordance with the methodology provided in subpart A of 10 CFR part 436 and in NBS Handbook 135 (Rev.), "Life Cycle Costing Manual for the Federal Energy Management Program." The total estimated costs and the total life cycle costs for the three facilities, and the cost bases are described in the Fluor report entitled "Cost Studies - Process and Facility Options for Pretreatment of Hanford Tank Wastes," given as attachment 1.

The schedules for the construction of the three facilities are given in attachment 1. The stand-alone and colocated facilities schedules indicate that the new facility will not be operational until 4/1/2004, while the analysis indicates that the expanded HWVP facility could be brought on line by 7/1/2003.

Westinghouse Hanford Company subsequently requested Fluor to use the cost/schedule analysis for the 212,000 ft² new stand-alone facility as a basis and perform cost/schedule estimates for a new stand-alone facility as originally proposed by WHC (Total Area = 175,000 ft²). This was primarily done for 2 reasons. Firstly, the WHC process engineering personnel shared the opinion that even with a slightly

smaller-sized facility the pretreatment operations can be performed satisfactorily and efficiently. Secondly, the Fluor estimate was requested to compare with the cost estimate performed by Kaiser Engineers Hanford Company (KEH) for the 175, 000 ft² facility in order to add more credibility to the final reported figures. All costs were estimated in FY88 dollars and escalated by 4.35% to FY89 to achieve compatibility with the KEH estimate for the facility. The escalation was performed using the escalation table provided by KEH. The schedule utilized for escalation was the same schedule reported in attachment 1 for the 212, 000 ft² new stand-alone pretreatment facility. Unlike the 212, 000 ft² facility, life cycle cost analysis has not been performed. The total estimated cost and its basis are discussed in detail in attachment 2. The total estimated cost of the 175, 000 ft² new stand-alone facility is \$668M compared with \$564M for the KEH estimate.

Westinghouse Hanford Company also requested Fluor to determine the total estimated cost of a colocated facility similar to the 175, 000 ft² new stand-alone facility for comparison. The total estimated cost of a colocated facility of design similar to the 175, 000 ft² stand-alone facility is \$637M. The details of the total estimated cost, and the construction cost estimate summary and basis are given in attachment 3.

Finally, WHC requested Fluor to give total estimated cost of a 132, 000 ft² new stand-alone facility. This was the facility for which KEH previously provided the total estimated cost to WHC (1). Some slight modifications were made to the facility layout, and both Fluor and KEH were asked to provide estimates of total project cost for the facility. Here again, the two independent estimates were sought for comparison purposes and also to add more credibility to the final reported figures. In addition, the smaller facility was selected (with 21, 000 gallon dissolvers) so that the costs can be compared to the cost of modifying the B-Plant to include similar pretreatment processing capabilities. The total estimated cost from Fluor for the facility is \$591M as compared with the KEH estimate of \$440M. The total estimated cost, and the construction cost summary and basis are detailed in attachment 4.

Two very important conclusions can be drawn from the Fluor study. First and foremost is the fact that the cost of a colocated facility of a comparable design is the lowest. Secondly, regardless of the size of the facility, the schedule for completion of construction of any type of facility is approximately the same.

REFERENCES

1. M. J. Kupfer, A. L. Boldt and J. L. Buelt, "Process and Facility Options for Pretreatment of Hanford Tank Wastes, " SD-WM-TA-015, Draft, September 1988.

9111340

ATTACHMENT 1



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COST STUDIES

**Process and Facility Options for Pre-Treatment
of Hanford Tank Wastes**

February 1989

**Fluor Daniel Inc.
Advanced Technology Division
Irvine, California**



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PRE-TREATMENT FOR HWVP

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 (Expanded Vitrification Building)

References

1. M. J. Kupfer, Al Boldt, J. L. Buelte (PNL), September 1988.
"Process and Facility Options for Pretreatment of Hanford
Tank Wastes", Westinghouse Hanford Company Richland,
Washington, SD-WM-TA-015

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1.0 Introduction

Fluor Daniel was requested by WHC to provide a cost estimate on a Total Estimated Cost (TEC) level for two pre-treatment plant alternatives. Fluor Daniel elected to evaluate a third concept at no cost to WHC or DOE. The cost estimate was conducted during a three week time period and estimated three pre-treatment alternatives as follows:

- 1) Stand-Alone Pre-treatment Facility
- 2) Integrated Pre-treatment Facility (integrated within the HWVP Vitrification Building)
- 3) Co-located Pre-treatment Facility (co-located within the HWVP Plot Boundaries) (Fluor Alternative)

The cost estimate includes an estimate of life cycle costs for each pre-treatment alternative, as discussed in Section 5.0.

Section 6.0 provides a summary of areas for further study and why these areas are important in the development and implementation of a Pre-treatment Facility.

2.0 Purpose

The purpose of this request is to evaluate three alternative pre-treatment facility locations and to document the physical and financial parameters of each location. In addition, areas requiring additional study are to be identified.

Table 2-1 provides a summary of the three pre-treatment alternatives. Included in Table 2-1 is an overview of the

TABLE C-1. PPE-TREATMENT ALTERNATIVE SUMMARY

	STAND-ALONE	CO-LOCATED	INTEGRATED	COMMENTS
ELECTRICAL				
NORMAL	INDEPENDENT FEED	INDEPENDENT FEED	EXPANDED HWVP	BASED ON MAINTAINING HVAC ZONE I EXHAUST
STANDBY	INDEPENDENT GENERATOR	EXPANDED HWVP	EXPANDED HWVP	
HVAC				
ZONE II/III/IV	SEPARATE SYSTEM	SEPARATE SYSTEM	EXPANDED HWVP SYSTEM	1. STAND-ALONE UTILIZES REMOTE HEPA
ZONE I	INDEPENDENT SYSTEM REMOTE HEPA STACK (ZONE I/II/III)	INDEPENDENT SUPPLY SYSTEM EXPANDED SAND FILTER (EXHAUST) EXPANDED EXHAUST FAN CAPACITY	EXPANDED HWVP SYSTEM	2. CO-LOCATED AND INTEGRATED USE SAND FILTER
HVAC MECHANICAL EQUIPMENT ROOM	ADDED CHILLER ROOM EXPANDED EQUIP ROOMS	EXPANDED HWVP CHILLERS AND EQUIP ROOMS	EXPANDED HWVP CHILLERS AND EQUIP ROOMS	ADDED CHILLER REQUIREMENTS
RAIL ACCESS	INDEPENDENT RAIL ACCESS ADDED RAIL WASH DOWN & AIRLOCK	INDEPENDENT RAIL ACCESS ADD RAIL WASH DOWN & AIRLOCK	HWVP RAIL ACCESS	
OPERATIONS CENTRAL BUILDING	INDEPENDENT FACILITY	INDEPENDENT FACILITY	UTILIZE HWVP EXISTING FACILITY	
TEMPORARY CONSTRUCTION FACILITY	INDEPENDENT FACILITY	NEW FACILITY	EXPANDED HWVP FACILITY	BASED ON SCHEDULES
FIRE WATER	INDEPENDENT SYSTEM	EXPANDED SYSTEM	EXPANDED SYSTEM	IN-CELL FIRE SYSTEM MAY BE REQUIRED
LAB STORAGE FEED/RETURN	NOT ADDRESSED	NOT ADDRESSED	NOT ADDRESSED	
SITE PREPARATION	ADDED REQUIREMENTS	EXPANDED	EXPANDED	
TEC (\$ X 1,000)				INTEGRATED FACILITY INCLUDES HWVP COST IMPACT (ADDITIONAL INDIRECTS AND ESCALATION)
DIRECT	\$348,801	\$329,284	\$317,529	
ESCALATION	\$246,896	\$233,778	\$173,418	
CONTINGENCY	\$191,744	\$181,879	\$158,969	
HWVP COST IMPACT	N/A	N/A	\$179,900	
TOTAL	\$787,443	\$744,961	\$829,816	
LIFE CYCLE COST (\$ X 1,000)	\$253,500	\$245,400	\$322,400	25 YR HWVP OPERATION, 20 YEAR PRETREATMENT PLANT OPERATION DECOMMISSION AT SAME TIME
SCHEDULE				INTEGRATED FACILITY EXTENDS HWVP COMPLETION BY 4 YEARS
START ENGINEERING	OCT 92	OCT 92	JAN 90	
START CONSTRUCTION	APR 96	OCT 96	APR 93	
START COLD TESTING	OCT 2002	DET 2002	JAN 2002	

TABLE 2-1. PRE-TREATMENT ALTERNATIVE SUMMARY

	STAND-ALONE	CO-LOCATED	INTEGRATED	COMMENTS
CELL PROCESS	BASED ON FLUOR REVIEW OF PROCESS BLOCK DIAGRAM	BASED ON FLUOR REVIEW OF PROCESS BLOCK DIAGRAM	BASED ON FLUOR REVIEW OF PROCESS BLOCK DIAGRAM	1. ADDED CELL EQUIP 2. WIDENED CELL 3. INCREASED LENGTH
CELL MAINTENANCE	ADDED: MAINTENANCE CELL CONTACT MAINTENANCE AREA LAYDOWN AREA	ADDED: MAINTENANCE CELL CONTACT MAINTENANCE AREA LAYDOWN AREA	ADDED: ADDITIONAL CELL CRANE EXTENDED HWVP CRANE MAINTENANCE AREA LAYDOWN AND DECON AREA ASSUMED RECC EQUIV TO CUT-UP ROOM FOR OTHER FACILITIES	1. ADDED ROOMS 2. ADDED EQUIPMENT FOR FAILED EQUIPMENT 3. ADDED EQUIPMENT CELL FOR CONTACT MAINTENANCE ROOMS
MSM & REPAIR	ADDED MAINTENANCE FACILITY	EXPANDED HWVP FACILITY	EXPANDED HWVP FACILITY	
SAMPLING/ANALYTICAL	SEPARATE LABORATORY AS PRESENTED WITH MINOR CHANGES	SEPARATE LABORATORY	SEPARATE LABORATORY	
OFFGAS	ADDED OFFGAS SYSTEM	ADDED OFFGAS SYSTEM	ADDED OFFGAS SYSTEM	1. SIGNIFICANT AMMONIA SCRUBBING EQUIPMENT (DILUTION FOR ION EXCHANGE ADDED TO CELL) 2. INCREASED UTILITIES
COLD CHEMICAL	ADDED SEPARATE FEED TANKS DOUBLED QUANTITY OF BULK STORAGE	ADDED SEPARATE FEED TANKS DOUBLED QUANTITY OF BULK STORAGE	ADDED SEPARATE FEED TANKS DOUBLED QUANTITY OF BULK STORAGE	1. ORIGINAL CONCEPT DIRECTLY FROM MAKE-UP TANKS 2. STANDARDIZED SIZE OF STORAGE TANKS
STEAM	ELECTRIC STEAM BOILER	EXPANDED HWVP SYSTEM	EXPANDED HWVP SYSTEM	1. REFLECTS CURRENT PHILOSOPHY OF ZERO DISCHARGE 2. STEAM REQUIREMENT INCREASED FROM INITIAL REPORT
COOLING WATER	INDEPENDENT SYSTEM	EXPANDED HWVP SYSTEM INCREASED COOLING TOWER	EXPANDED HWVP SYSTEM INCREASED COOLING TOWER	COOLING WATER REQUIREMENT INCREASED
INSTRUMENT AIR	INDEPENDENT SYSTEM	EXPANDED HWVP SYSTEM	EXPANDED HWVP SYSTEM	SYSTEMS ADDED BASED ON FLUOR CALCS.
VENT SYSTEM WASTE SYSTEMS	ADDED SYSTEMS	EXPANDED AND ADDED	EXPANDED AND ADDED	BASED ON MEETING CURRENT PERMITTING AND ENVIRONMENTAL REQUIREMENTS
HPS	SEPARATE INDEPENDENT HPS SYSTEM	SEPARATE INDEPENDENT HPS SYSTEM	ADDED I/O POINTS TO HWVP	ADDED SYSTEM
DCS				1. SEPARATE INDEPENDENT CONTROL ROOMS 2. BASED ON PFM CONTROL PHILOSOPHY (NOT AS COMPLEX AS HWVP) 3. ADDED SYSTEM

major facility areas and the deviations from the WHC supplied data. Also included in Table 2-1 is a summary of the TEC cost, life cycle cost, and key schedule dates for each pre-treatment alternative. Additional detail is provided in Sections 3.0, 4.0 and 5.0 of this report.

3.0 Description of Alternatives

A table (Table 2-1) comparing the Stand Alone, Co-located and Integrated Pretreatment facilities is included in Section 2 of this report.

3.1 Process Design Criteria

3.1.1 Introduction

The Waste Pre-treatment Facility could potentially process up to five major types of waste currently in storage at the Hanford 200 areas. Each waste type requires different pre-treatment methods with various alternatives. Reference 1 describes the various waste and waste treatment methods.

For purposes of estimating a pre-treatment option was selected for each waste type. This selection formed the basis for process equipment requirements and chemical usage.

The selected option for each waste type are discussed below.

3.1.2 NCAW (Neutralized Current Acid Waste)

The neutralized current acid waste contains high concentrations of Sr-90. No equipment has been provided for the Sr-90 removal.

NCAW will be washed to remove soluble salts prior to feed into the pre-treatment facility. The washed sludge will be sent to the HWVP for vitrification. NCAW supernatant and sludge water will be processed through the pre-treatment facility to remove Cs-137 by ion exchange. The removed Cs-137 will be combined with other pre-treatment plant sludges and eventually vitrified in the HWVP.

Sludge washing could be accomplished in the pre-treatment plant or in a tank farm DST. The selected alternative considers the prior therefore not affecting the pre-treatment equipment or chemical usage. Figure A-1 (ref 1) is a block flow diagram of the selected process.



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3.1.3 PFP (Plutonium Finishing Plant Waste)

The Plutonium Finishing Plant wastes have relatively low concentrations of fission products. The PFP sludge is washed to remove soluble salts which are sent to the Grout Treatment Facility. The washed sludge is dissolved in HNO_3 and processed through the TRUEX process, within the pre-treatment facility, to separate the transuranic (TRU) elements from the bulk of the inert salts, particularly chromium.

The removed TRU is combined with the solids remaining after the dissolution step for eventual vitrification in the HWVP. Figure A-4 (Ref 1) is a block flow diagram of the selected process and Figure A-11 (ref 1) contains a preliminary material balance.

3.1.4 NCRW (Neutralized Cladding Removal Wastes)

The neutralized cladding removal wastes, similar to PFP wastes, have relatively low concentrations of fission products.

NCRW wastes are pre-treated in a manner similar to PFP wastes. As a result of the high fluoride content of this waste, the nitric acid concentration used to dissolve the sludge is less than that used for PFP wastes.



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The NCRW supernatant and sludge washes are sent to the Grout Treatment Facility. The TRUEX process is used to remove the transuranic (TRU) elements from the bulk of the inert salts, notably fluoride and zirconium. The TRU fraction is combined with the undissolved sludge for eventual vitrification in the HWVP. Figure A-6 (ref 1) is a block flow diagram of the selected process and Figure A-12 contains a preliminary material balance.

3.1.5 CC (Complexant Concentrate Waste)

Both the complexant concentrate supernatant and sludge contain various organic complexants. It is assumed that these complexants must be destroyed before either TRUEX processing or routing the treated CC to the Grout Facility.

A slurry of CC supernatant and sludge is treated with hydrogen peroxide to destroy the organic complexants. The sludge is dissolved by use of a nitric acid solution which will acidify the supernatant and then it is processed through the TRUEX system.

Undissolved sludge is combined with the TRUEX TRU product for eventual vitrification in the HWVP. The raffinate is neutralized for routing to the Grout Facility.



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Figure A-9 (ref 1) shows the basic block flow diagram but the complexant destruction step is done prior to nitric acid addition.

Figure A-13 (ref 1) contains a preliminary material balance with the exception of the hydrogen peroxide addition.

3.1.6 SST (Single Shell Tank Waste)

The single shell tank wastes consist of a sludge layer covered by a salt cake. Wastes in the SSTs comes from several sources and is likely to vary substantially in composition from tank to tank.

The remaining fission product concentrations in the SST is relatively low. The transuranic (TRU) concentration in only half of the 149 single shell tanks exceeds 100 nCi/g.

It is assumed that only 75 single shell tanks with TRU concentrations in excess of 100 nCi/g are pre-treated. The retrieved SST contents are washed to remove the bulk of the soluble salts which are sent to the Grout Facility. The bulk of the washed sludge is dissolved in a two step process utilizing nitric acid and oxalic acid. TRUEX is used to remove the TRU components from the dissolved sludge as well as the relatively high concentrations of uranium. The uranium is

combined with the TRUEX raffinate,
neutralized and sent to the Grout Facility.

Recovered TRU is combined with the
undissolved sludge and vitrified in the HWVP.
A process block flow diagram is shown in
Figure A-10 (ref 1) and Figure A-14 (ref 1)
contains a preliminary material balance.

3.1.7 Process Design Impact to In-Cell Equipment

Several in-cell equipment items were added to
the equipment list and layout drawings
provided by WHC.

In comparing the Pre-treatment Flow Diagram
ES-800-00 with the equipment list and the
Facility Plan ES-800-02, three items appeared
on the Flow Diagram but not on the equipment
list or layout. The Precoat Storage Tank and
the two PHP Filters were omitted. The
filters are assumed to be mounted over the
Sludge Receiver Tanks but additional cell
floor space was needed for the Precoat
Storage Tank.

In a visit to WHC, Fluor personnel were
advised to add an ammonia scrubber system to
the in-cell equipment. This system includes
a 6 ft D x 12 ft H ammonia scrubber column, a
4000 gallon scrubber solution receiver, a 20
GPM concentration and a 4000 gallon
concentrator condensate receiver. Fluor also



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added a 1000 gallon concentrator bottom receiver. These items added to the required cell space.

In discussions with WHC personnel, it was determined that the space allocated for the 21 remotely maintained centrifugal contactors was not sufficient. Additional space was allocated in the cell for these assemblies. The attendees at the above mentioned meeting were, Mike Kupfer, John Garfield, Al Boldt and, Dave Place from WHC. The Fluor representatives were B. J. Reckman and Rich Keenan. The interpretation of these requirements is indicated on the marked-up flow diagram in Appendix E.

3.2 Stand Alone Pre-treatment System

3.2.1 General Description

The salient features of the Stand Alone Facility are described as follows.

A table (Table 2-1) comparing the Stand-Alone, Co-Located and Integrated Pre-treatment facilities is included in Section 2 of this report.



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- 1) The facilities are located within the 200 E Area of the Hanford Site, as an all new Stand Alone Facility, complete with all HVAC Systems, utilities, electric power, emergency generator, additive, sampling, laboratories, maintenance, central control and office facilities.
- 2) The Pre-treatment Flow Diagram (figure E) of SD-WM-TA-015 has been modified to include additional feed and storage tanks for additives, plus necessary utilities and additional modifications listed in table 2-1.

3.2.2 Cell Arrangement

The in-cell canyon arrangement reflects the full in-cell equipment list as modified by Fluor (Appendix A).

3.2.3 Canyon Size

Embedded nozzles and jumpers require a minimum of 5'-0" on each side of the 15'-0" diameter vessels to the wall. This requires a minimum cell width of 25'-0". Cell length is set by spacing of in-cell equipment 3'-0" apart; this results in an overall cell length of approximately 310'-0". The spacing appears adequate for approximately 600

embedded nozzles (including 20% spares) to be located at the gallery walls. Pipe trench and closed loop utility jumper embeds are less congested.

Cover blocks are 40'-0" above the cell floor, to underside, which is sufficient to handle the largest stack up of equipment (25'-0"H) and jumpers. Cover blocks are assumed to be 3'-0" thick as at HWVP. Shield wall thickness is assumed to be 5'-0".

Shield windows or manipulators are not required for the chemical cell walls. Lighting and all handling is via the canyon crane.

All canyon cell walls and floors are stainless steel lined to the bottom of the cover blocks.

3.2.4 Canyon Crane

A single 30 ton capacity 75'-0" span canyon crane equipped with lighting and CCTV will service all remote cells and the railroad well. Crane rails must be a minimum of 32'-0" above the cover blocks for the maximum length component to clear. The distance above the crane to the underside of the roof is 12'-0".



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A crane maintenance area (CMA) is provided for a 20'-0" wide crane bridge. Depth comparable to HWVP CMA is assumed.

A rising shield door is assumed (vs HWVP hoist system).

3.2.5 Master Slave Manipulator Repair

A single elevation metal building is required for MSM repair (6000 sq ft) and is located

adjacent to the Analytical Laboratory at grade. The equipment and configuration will generally conform to the HWVP approach. Space requirements are factored from HWVP based on the ratio of installed MSMs in the two facilities. One Decon glove box is required. Other equipment, e.g., monorails & tables, are replicated from HWVP. An airlock is required at each of two entry/egress points.

3.2.6 Regulated Maintenance Shops

Ample space has been allocated in the facility lower level corridor for regulated maintenance shops. Equipment costs are assumed equivalent to those used on the HWVP.



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3.2.7 Non-regulated Maintenance Shop

An external single elevation metal building is required for non-regulated maintenance activities. Space (5625 sq ft) and equipment equivalent to HWVP have been allowed. Access to non-regulated maintenance is from outside the controlled areas.

3.2.8 Failed Equipment Handling.

To allow prompt exchange of failed and replacement in-cell components by the canyon crane, it is necessary to provide remote and contact maintenance space. To assure this capability, a laydown area separate from the decon and repair cells is also required. This area, as a minimum, is sized to accept a dissolver, the largest single component. An area 30'-0" x 25'-0" has been provided.

A significant fraction of the failed equipment will not be repairable remotely nor decontaminable to contact levels, therefore, a Hanford standard burial box will be utilized for disposal. A remote cell is required for remote decontamination/maintenance of failed equipment and for size reduction (cut up) of equipment to be disposed of. A Failed Equipment Cut-Up Area 26'-0" x 39'-0" has been provided for this purpose. The cell is fully lined with stainless steel. Four shield window stations with master slave



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manipulators at the corridor wall, remote lighting fixtures, CCTV, utility service and decon solution supplies and two Electro-mechanical manipulators to operate the in-cell equipment are provided. For purposes of the cost estimate, the Failed Equipment Cut-up Area (FECA) equipment was assumed to be comparable to the Process Facility Modification Project FECA equipment.

Decontamination requirements to allow manned access into the failed equipment cut-up cell, would involve lengthy procedures, making it impractical. Also, loading of the disposal box, given the limited space and high contamination in this cell, is impractical. A separate, lower contamination, manned access cell (25'-0" X 39'-0") for contact maintenance and disposal box loading is provided. This cell will be capable of remote box handling and closure. It is equipped with two shield window stations each with two Master Slave Manipulators. One EMM will also be required as well as a hoist system for component handling. The cell is fully stainless steel lined and equipped with utility supply and decon solution services.

The above approach is consistent with HWVP plans.

3.2.9 Sampling and Analytical Laboratory

Samples will be drawn in shielded cells adjacent to the canyon cells and the corresponding in-cell equipment. Four cells (two for each process cell) will be required. Combined with these cells will be remote analytical cells. Design will be comparable to the HWVP concept. A total of 35 sample assemblies are provided, spaced at 1'-4" centers. Three sample caves will collect seven samples each. This requires 10'-0" of inside length. An additional 10'-0" is required for analytical work for a total inside length of 20'-0". The fourth cave will collect 14 samples and have two analytical cells for a total inside length of 40'-0". A single service room is provided between each set of sample/analytical caves in the two corridors to operate the transfer drawers servicing these cells.

Shielding is assumed to be 28" of high density concrete on three sides. Equipment includes 10 - 28" deep shield windows, 20 MSM's and 35 liquid sample modules. In-cell equipment is comparable to HWVP except that four transfer drawers are required.

The hot laboratory will be a single level metal building (3780 sq ft) located adjacent to the main structure. Equipment requirements and costs are assumed to be the same as for the HWVP analytical laboratory.



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A cold laboratory is required for analysis of incoming cold chemicals via rail or truck. This facility is assumed to be identical in size and cost to the HWVP concept.

3.2.10 HVAC Systems

The stand-alone facility is serviced by the following HVAC systems:

- 1) Zone I Area HVAC System
- 2) Zone II & III HVAC System
- 3) Zone IV HVAC System
- 4) Chilled Water System

General basis and assumptions utilized to establish sizing of systems and consistency with HWVP are as follows:

- 1) The design is based on criteria established by DOE order 6430.1A
- 2) The design is based on HVAC zoning as indicated on the WHC drawings that were provided.
- 3) Zone I air quantities are based on five air changes per hour.
- 4) Zone II air quantities are based on ten air changes per hour.
- 5) Zone III air quantities are based on five air changes per hour.
- 6) Zone IV air quantities are based on 1.1 CFM per square foot.



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3.2.11 Zone I HVAC Area System

The Zone I system for the stand-alone facility utilizes 100 percent outside air which is conditioned and supplied to the various areas through the air supply handling units. The exhaust air from these areas is routed through two stages of remotely maintained HEPA filters and one stage of contact maintained HEPA filters. The remote filters are located in a shielded room where a robotic EMM is utilized for filter changeout. Maintenance space is provided for staging and maintenance of the robot. Filter disposal is accomplished by compaction and placement into shielded containers.

The third stage of filtration is located in a man access area and the filters can be bagged out.

The Zone I exhaust fans exhaust the air to the outdoors by way of a combined stack with isokinetic monitoring.

Equipment rooms for the HVAC were enlarged to accommodate the HVAC equipment. In most cases, this required increasing the height of the rooms. The remote HEPA filter room was forced deeper into the ground to reduce the impact on the above ground structure.



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This system is patterned after the remote system designed for the Process Facility Modifications Project but expanded with additional filter plenums. Costs are established from the PFMP cost estimate.

3.2.12 Zones II and III HVAC Area System

The Zone II and III areas are served by an independent HVAC system using 100 percent outside air which is conditioned and supplied to the Zone III areas by supply air handling units. The air is conditioned and supplied initially to the Zone III areas.

The Zone III exhaust air is cascaded to the Zone II areas through a single stage of contact maintained HEPA filtration.

The exhaust air from the Zone II and III areas is exhausted through two stages of contact maintained HEPA filters. This exhaust is combined with the Zone I air downstream of the final filtration and routed to a common stack.

The stack is a grade mounted stand approximately 150'-0" in height.

Equipment rooms for these systems were expanded in height and square footage to accommodate the additional filtration equipment.



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3.2.13 Zone IV HVAC Area System

The Zone IV areas consisting of the Control Room, Offices, Change Rooms, Lunch Room and Toilets are served by an independent HVAC system. This system utilizes supply air handling units and return/exhaust fans to provide conditioned air to these areas.

Additional equipment room space is provided to accommodate this system.

3.2.14 HVAC Chilled Water System

The chilled water system provides chilled water to the supply air-handling unit cooling coils that serve all HVAC zones. This system consists of centrifugal chillers and the associated chilled water and condenser water pumps. The cooling tower is located outside in close proximity to the chiller room.

A room was added for this system which was not accounted for in the building layouts provided by WHC.

3.2.15 Electrical System

The electrical system provides normal and standby power for the facility. A single emergency generator is furnished to supply standby power to the Zone I exhaust system and safety related systems within the



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facility. The emergency generator is estimated at 300 KW and is driven by a diesel engine.

The facility power is supplied by a single double-ended load center from the 13.8 KV feeders.

3.3 Integrated Pre-treatment Facility

3.3.1 General Description

A table (Table 2-1) comparing the Stand-Alone, Co-Located and Integrated Pre-treatment facilities is included in Section 2 of this report.

The salient features of the Integrated Facility are described as follows:

- 1) The facilities are located within an extension of the Vitrification Building of the HWVP, adding some 370'-0" feet to the North-South dimension of the Vitrification Building by extending the process cell and gallery area.
- 2) HVAC Systems, Utilities and Electrical power are expanded to include the Pre-treatment process.



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- 3) The Pre-treatment Flow Diagram (Fig E-1 of SD-WM-TA-015) has been modified to include additional feed and storage tankage for additives, plus additional modifications listed in the referenced table.

3.3.2 Cell Arrangement

The in-cell canyon arrangement reflects the full in-cell equipment list as modified by Fluor (Appendix B).

3.3.3 Process Canyon Size

Embedded piping and jumpers require a full 5'-0" to either side of 15'-0" wide vessels to the wall requiring the cell width to be 25'-0". Presently a 22'-6" width is shown for the east cell on drawing ES-800-12. It is anticipated that reconfiguration of equipment will permit a 25'-0" width where required; a narrower cell for smaller equipment can be provided so overall building width can be maintained.

Cover blocks are 43'-0" above the cell floor, to the underside, consistent with HWVP requirements. This is sufficient for the largest stack up of equipment (25'-0"H) and jumpers. Cover blocks are assumed to be 3'-0" thick consistent with HWVP. Shield wall thickness is assumed to be the same as HWVP



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for the full canyon length at both sides of the canyon.

Cell length is set by spacing in-cell equipment 3'-0" apart side to side. This spacing appears adequate for approximately 600 embedded nozzles (incl 20% spares) to be located at the gallery walls. A pipe trench is not feasible, therefore, in-cell remote (XMAS TREE) piping, consistent with the concept used in HWVP, is assumed for the approximately 90 in-cell connections that have been estimated as being required.

Shield windows or manipulators are not required for the chemical cells. Lighting and in-cell handling is accomplished via the canyon crane.

3.3.4 Canyon Crane

In addition to the existing HWVP canyon crane, a single 30 ton capacity version of the HWVP canyon crane with lighting, CCTV and the EEC is required. The crane will share the HWVP Canyon Crane rails. HWVP lifts are comparable so rail height and ceiling height per HWVP can be retained.

Bus bar corridor extension is required at the third floor.



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The crane maintenance area (and building length at South end) must be extended 20'-0" so the Crane Maintenance Area can simultaneously accept the two cranes. The shield door and decon systems designed for the HWVP can be utilized for both canyon cranes.

3.3.5 Master Slave Manipulator (MSM) Repair

Expansion of the HWVP MSM repair facilities is required by a factor of 40% (300 sq ft) to handle the greater number of MSMs utilized by the integrated facility. Each HWVP shop should be expanded equally. Adjustment of the Analytical MSM repair shop location is required to accommodate the extended east corridor, conceptually, access to the shop from the corridor will be unchanged. No additional decon glove boxes are required. General equipment needs and cost are increased proportional to the expanded floor area.

3.3.6 Regulated Maintenance Shops

Regulated maintenance shop space is provided equivalent to the stand alone facility lower west level corridor. Equipment costs for this new shop are assumed equivalent to the HWVP.

3.3.7 Non-Regulated Maintenance Shop

An additional external single elevation metal building or expansion of the HWVP Non-Regulated Maintenance shop is required. Space and equipment equivalent to 50% of HWVP (2800 sq ft) is allowed. Access to non-regulated maintenance is from outside of the controlled areas only.

3.3.8 Failed Equipment Handling

Repair and disposal of failed in-cell equipment requires remote and contact maintenance space to allow prompt exchange of failed and replacement components by the canyon crane. A lay down area separate from the decon and repair cells is required to assure that this can be accomplished. Maximum laydown area consistent with other cell configurations has been provided.

A significant fraction of the failed equipment will not be repairable remotely nor decontaminable to contact levels, requiring that it be disposed of in a Hanford standard disposal box. A remote cell is required for remote decontamination maintenance and size reduction (cut up), of failed equipment to be disposed of. A Failed Equipment Cut-up Area has been provided for this purpose. This cell will be completely lined with stainless steel. Four shield window stations with MSMs



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at the corridor wall, remote lighting fixtures, CCTV, utility services and decontamination supplies are furnished. In addition, two electro-mechanical manipulators are required to operate the in-cell equipment. As in the stand-alone facility, Process Facility Modification (PFM) project FECA equipment was used as the estimating basis.

Decontamination requirements to allow manned access into the failed equipment cut up area will involve lengthy procedures making it impractical. Also, loading of the disposal box, given the limited space and high contamination in this cell, is impractical. A separate, lower contamination manned access cell is required. This cell is capable of remote box closure and handling. It is equipped with two shield window stations, each with two MSMs. One EMM will also be required as well as a hoist system for component handling. This cell is fully stainless steel lined and equipped with utility supply and decontamination services.



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3.3.9 Sampling and Analytical Laboratory

Samples will be drawn in shielded caves adjacent to the canyon cells and the corresponding in-cell equipment. Four cells total (two for each process cell) will be required. Combined with these cells will be the remote analytical cells. Design will be comparable to the HWVP concept. A total of 35 sample assemblies are provided spaced at 1'-4" centers. Three sample caves will collect seven samples each (requiring 10'-0") plus 10'-0" for analytical work for a total inside length of 20'-0". The fourth cell will collect 14 samples and have two analytical cells for a total inside length of 40'-0". A single service room is provided between each set of sample/analytical cells in the two corridors to operate the sample transfer drawers servicing the cells.

Shielding for the sample cells is 28" of high density concrete on three sides. Equipment includes 10 - 28" deep shield windows, 20 MSMs and 35 liquid sample modules. In-cell equipment is comparable to HWVP except that four transfer drawers are required instead of two. Additionally, four pneumatic transfer systems are required for sending and receiving sample vials to and from the Laboratory.



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The hot laboratory is located on the same mezzanine level to the North side of the sample cells. The HWVP laboratory is replicated, mirror image, for space allocation purposes. Equipment costs are assumed equivalent to comparable HWVP Facilities (Lab & three support rooms.)

A cold laboratory is required for analysis of incoming cold chemicals via rail or truck. A facility identical in size and cost to HWVP is assumed to be required.

3.3.10 HVAC Systems

The integrated facility is serviced by the following HVAC systems:

- 1) Zone I Area HVAC System
- 2) Zone II & III HVAC System
- 3) Zone IV HVAC System
- 4) Chilled Water System

General basis and assumptions utilized to establish sizing of systems and consistency with HWVP are as follows:

- 1) The design is based on criteria established by DOE order 6430.1A
- 2) The design is based on HVAC zoning as indicated on the WHC drawings that were provided.



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- 3) Zone I air quantities are based on five air changes per hour.
- 4) Zone II air quantities are based on ten air changes per hour.
- 5) Zone III air quantities are based on five air changes per hour.
- 6) Zone IV air quantities are based on 1.1 CFM per square foot.

3.3.11 HWVP System Expansion

Since the integrated facility is an expansion of the current HWVP design, it is necessary to expand the HVAC systems to accommodate the additional loads.

The increased loads have been accommodated by adding equipment and/or increasing equipment sizes of the existing designed equipment. The Vitrification Building Mechanical Room, Sand Filter, and Fan House, have been increased in size to accommodate the additional load. The chiller system capacity has also been increased.

The Zone I exhaust system is filtered, utilizing the existing HWVP design concept. This concept consists of a sand filter with a final stage of contact maintained HEPA filters.

3.3.12 Electrical System



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Normal and stand-by power for the expanded facility will be fed from the existing HWVP designed system.

Emergency stand-by power will be supplied from the existing design emergency generators.

3.4 Co-Located Facility

3.4.1 General Description

The salient features of the Co-located Facility are described as follows.

A table (Table 2-1) comparing the Stand-alone, Co-located and Integrated Pre-treatment facilities is included in Section 2 of this report.

- 1) The facilities are located within the 200 E Area of the Hanford Site as a new Stand-alone Cell Facility. The cell-facility is located adjacent to the sand filter and near the HWVP Vittrification Building.
- 2) The pre-treatment process cell and related cells are located in a separate building with an independent HVAC Supply and Zone II, III and IV exhaust system. The Zone I exhaust system, sand filter,



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HEPA filters, exhaust fans, and stack are shared with HWVP.

- 3) Several utilities are serviced from the expanded HWVP systems such as steam, air, cooling water, chilled water, etc.
- 4) The Pre-treatment Flow Diagram (figure E) of SD-WM-TA-015 has been modified to include additional feed and storage tanks for additives, plus necessary utilities and additional modifications in Table 2-1.

3.4.2 Cell Arrangement

The in-cell canyon arrangement reflects the full in-cell equipment list as modified by Fluor (Appendix C).

3.4.3 Canyon Size

Embedded nozzles and jumpers require a minimum of 5'-0" on each side of the 15'-0" diameter vessels to the well. This requires a minimum cell width of 25'-0". Cell length is set by spacing in-cell equipment 3'-0" apart this results in an overall cell length of 310'-0". The spacing appears adequate for approximately 600 embedded nozzles (including 20% spares) to be located at the gallery walls. Pipe trench and closed loop utility jumper embeds are less congested.



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Cover blocks are 40'-0" above the cell floor (to underside) which is sufficient to handle the largest stack up of equipment (25'-0"H) and jumpers. Cover blocks are assumed to be 3'-0" thick as at HWVP. Shield wall thickness is assumed to be 5'-0".

Shield windows or manipulators are not required for the chemical cell walls. Lighting and all handling is via the canyon crane.

All canyon cell walls and floors are stainless steel lined to the bottom of the cover blocks.

3.4.4 Canyon Crane

A single 30 ton capacity 75'-0" span canyon crane equipped with lighting and CCTV will service all remote cells and the railroad well. Crane rails must be a minimum of 32 feet above the cover blocks for the maximum length component to clear. The distance above the crane to the underside of the roof is 12'-0".

A crane maintenance area is provided for a 20'-0" wide crane bridge. Depth comparable to HWVP Crane Maintenance Area is assumed.

A rising shield door is assumed (vs HWVP hoist system).

3.4.5 Master Slave Manipulator (MSM) Repair

Expansion of the HWVP MSM repair facilities is required by a factor of 40% (300 sq ft) to handle the greater number of MSMs utilized by the integrated facility. Each HWVP shop should be expanded equally. Adjustment of the Analytical MSM repair shop location is required to accommodate the extended east corridor, conceptually, access to the shop from the corridor will be unchanged. No additional decon glove boxes are required. General equipment needs and cost are increased proportional to the expanded floor area.

3.4.6 Regulated Maintenance Shops

Ample space has been allocated in the facility lower level corridor. Equipment costs are assumed equivalent to HWVP.

3.4.7 Non-Regulated Maintenance Shop

An additional external single elevation metal building or expansion of the HWVP Non-Regulated Maintenance shop is required. Space and equipment equivalent to 50% of HWVP (2800 sq ft) is allowed. Access to non-regulated maintenance is from outside of the controlled areas only.

3.4.8 Failed Equipment Handling



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Repair and disposal of failed in-cell equipment requires remote and contact maintenance space to allow prompt exchange of failed and replacement components by the canyon crane. A lay down area separate from the decon and repair cells is required to assure that this can be accomplished. Maximum laydown area consistent with other cell configurations has been provided.

A significant fraction of the failed equipment will not be repairable remotely nor decontaminable to contact levels. This requires that it be disposed of in a Hanford standard disposal box. A remote cell is required for remote decontamination maintenance and size reduction (cut up), of failed equipment to be disposed of. A Failed Equipment Cut-up Area has been provided for this purpose. This cell will be completely lined with stainless steel. Four shielded window stations with MSMs at the corridor wall, remote lighting fixtures, CCTV, utility services and decon solution supplies are furnished, in addition, two electro-mechanical manipulators (EMM) are required to operate the in-cell equipment. As in the previous alternatives, the equipment for the Failed Equipment Cut-up Area for the Process Facility modifications (PFM) project was used as the basis for the cost estimate.



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Decontamination requirements to allow manned access into the failed equipment cut up area will involve lengthy procedures making it impractical. Also, loading of the disposal box, given the limited space and high contamination in this cell, is impractical. A separate, lower contamination manned access cell is required. This cell is capable of remote box closure and handling. It is equipped with two shield window stations, each with two MSMS. One EMM will also be required as well as a hoist system for component handling. This cell is fully stainless steel lined and equipped with utility supply and decon solution services.

3.4.9 Sampling and Analytical Laboratory

Samples will be drawn in shielded cells adjacent to the canyon cells and the corresponding in-cell equipment. Four cells total (two for each process cell) will be required. Combined with these cells will be the remote analytical cells. Design will be comparable to the HWVP concept. A total of 35 sample assemblies are provided spaced at 1'-4" centers. Three sample caves will collect seven samples each (requiring 10'-0") plus 10'-0" for analytical work for a total inside length of 20'-0". The fourth cell will collect 14 samples and have two analytical cells for a total inside length of 40'-0". A single service room is provided

between each set of sample/analytical cells in the two corridors to operate the sample transfer drawers servicing the cells.

Shielding for the sample cells is 28" of high density concrete on three sides. Equipment includes 10 - 28" deep shield windows, 20 MSMS and 35 liquid sample modules. In-cell equipment is comparable to HWVP except that four transfer drawers are required instead of two. Additionally, four pneumatic transfer systems are required for sending and receiving sample vials to and from the Laboratory.

The hot laboratory is located on the same mezzanine level to the North side of the sample cells. The HWVP laboratory is replicated mirror image for space allocation purposes. Equipment costs are assumed equivalent to comparable HWVP Facilities (Lab & three support rooms.)

A cold laboratory is required for analysis of incoming cold chemicals via rail or truck. A facility identical in size and cost to HWVP is assumed to be required.

3.4.10 HVAC Systems

The Co-Located Facility is served by the following HVAC systems:



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- 1) Zone I Area HVAC System
- 2) Zone II & III HVAC System
- 3) Zone IV HVAC System
- 4) Chilled Water System

General basis and assumptions utilized to establish sizing of systems and consistency with HWVP are as follows:

- 1) The design is based on criteria established by DOE order 6430.1A
- 2) The design is based on HVAC zoning as indicated on the WHC drawings that were provided.
- 3) Zone I air quantities are based on five air changes per hour.
- 4) Zone II air quantities are based on ten air changes per hour.
- 5) Zone III air quantities are based on five air changes per hour.
- 6) Zone IV air quantities are based on 1.1 CFM per square foot.

3.4.11 Zone I HVAC Area System

The Zone I system is served by an independent supply system with 100 percent outside air being furnished through air handling units. The air is conditioned and routed to the Zone I areas. The exhaust air is routed through ducting to the expanded HWVP exhaust system. The air is filtered through the expanded sand



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filter and final HEPA filtrations to the HWVP stack.

3.4.12 Zone II and Zone III HVAC Area Systems

The Zone II and III Areas are served by an independent HVAC system using 100 percent outside air which is conditioned and supplied to the Zone III areas by supply air handling units. The air is conditioned and supplied initially to the Zone III areas.

The Zone III exhaust air is cascaded to the Zone II areas through a single stage of contact maintained filtration.

The exhaust air from the zone II and III areas is exhausted through two stages of contact maintained HEPA filters. This exhaust is routed to an independent stack.

3.4.13 Zone IV HVAC Area System

The Zone IV areas, similar to those in the stand-alone facility, will utilize an independent HVAC system. The system utilizes supply air handling units and return exhaust fans to provide the required conditioned air.

Additional equipment room space is provided to accommodate this system.



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3.4.14 HVAC Chilled Water System

Chilled water will be supplied from the expanded HWVP system.

3.4.15 Electrical System

The electrical system provides normal and stand-by power for the facility. The electrical needs will be furnished from the expanded HWVP system. A local distribution center will be fed from the HWVP transformers and switch yard. Emergency power will also be supplied from the currently designed emergency generators.

4.1 Summary and Comparisons

Table 4-1 is a summary of the Total Estimated Cost (TEC) for the three pre-treatment alternatives. The total direct costs were estimated in accordance with Section 4.2, General Basis and Assumptions. The estimates for the stand-alone, integrated and co-located pre-treatment alternatives are discussed in Sections 4.3, 4.4 and 4.5 respectively. The contingency analysis is discussed in Section 4.6.

4.2 General Basis and Assumptions

In order to prepare the cost estimate for the three pre-treatment alternatives, several bases and

TABLE 4-1. TOTAL ESTIMATED COST(TEC) SUMMARY - X \$1,000

COST CATEGORIES	STAND-ALONE	INTEGRATED	CO-LOCATED
Detailed Design	\$50,710	\$46,163	\$47,872
Field Engr & Inspection	\$19,873	\$18,091	\$18,761
Construction	\$228,423	\$207,943	\$215,641
Engineering Management	\$19,188	\$17,467	\$18,114
Construction Management	\$13,477	\$12,269	\$12,723
Project Management	\$17,132	\$15,596	\$16,173
Total Cost (Fy 88 Basis)	\$348,803	\$317,529	\$329,284
Escalation	\$246,896	\$173,418	\$233,798
Contingency	\$191,744	\$158,969	\$181,879
HWVP Cost Impact		\$179,900	
Total Estimated Cost	\$787,443	\$829,816	\$744,961



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assumptions were established. These bases and assumptions are noted below:

- 4.2.1 The basic configuration of the stand-alone facility and the integrated facility used the drawings developed by WHC. Modifications were made to those drawings, only in those areas where current experience dictated that modifications were necessary. Those modifications are described in Section 3.0. There was not sufficient time to perform a detailed analysis of the modifications, however, the modifications appear justified based on current design experience.
- 4.2.2 HWVP unit rate pricing data were applied wherever possible. Deviations from HWVP pricing data are noted in the estimate basis and contained in Tables 4-2, 4-3 and 4-4.
- 4.2.3 Decontamination and decommissioning costs were not considered in the cost estimate.
- 4.2.4 The cost estimate was prepared on a Total Estimated Cost (TEC) basis. Expense funded costs such as Conceptual Design, Research and Development, and pilot plant development were not estimated.
- 4.2.5 Detailed Engineering, Field Engineering and Inspection, Project Management, Engineering Management, and Construction Management costs



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were included using the comparable percentage of direct cost in the HWVP cost estimate.

- 4.2.6 The pre-treatment plant availability was assumed to be 50%.
- 4.2.7 Escalation was calculated using the HWVP escalation index applied to the schedules included in Sections 4.3, 4.4, and 4.5.
- 4.2.8 The direct cost basis was mid-FY1988. HWVP direct costs and direct costs extracted from the PFM Facility were escalated to mid 1988.
- 4.2.9 Schedules assumed that a fast track approach to technology assimilation would be applied to the Integrated Case. Both the Co-Located and Stand-Alone Cases assumed a more significant technology demonstration and documentation step would be required in parallel with the validation step.
- 4.2.10 Feed supply/return lines were not included in the cost estimate.

4.3 Stand-Alone Estimate and Schedule

4.3.1 Stand-Alone Estimate

The stand-alone pre-treatment facility was estimated as a separate facility. The direct



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cost estimate for construction and procurement, as well as the estimate basis is shown in Table 4-2. Included at the end of Section 4-6, is a priced equipment list for the stand-alone pre-treatment alternative.

4.3.2 Stand-Alone Pre-treatment Schedule

The schedule for the stand-alone pre-treatment facility is shown in Figure 4-1. The stand-alone schedule is characterized by dual critical path. The first critical path flows through the conceptual design and advanced conceptual design to support the Environmental Impact Statement and RCRA and then through engineering and construction. The second critical path flows through the pre-treatment pilot plant and demonstration of the pre-treatment process for preparation of the technical data package. It may be possible to accelerate the second critical path based on a more detailed analysis.

An additional observation, regarding the stand-alone schedule, is that the schedule shows a requirement for capital funding in government fiscal years 1993 and 1994 which are the peak years on the HWVP budget authorization (BA) profile. However, the requirement for the large capital expenditures for construction occurs in mid 1996 which is later than HWVP peak BA funding



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requirements. The funding interface should be a subject of a future review.

4.4 Integrated Pre-treatment Estimate and Schedule

4.4.1 Integrated Pre-treatment Estimate

The integrated pre-treatment facility was estimated by combining the pre-treatment process with the existing HWVP facility. The direct cost estimate for construction and procurement and the estimate basis is shown in Table 4-3. The priced equipment list, for the integrated pre-treatment alternative, is included behind Section 4.6.

The integrated pre-treatment Total Estimated Cost (TEC) includes a cost impact for HWVP. The additional cost incurred by HWVP is due to escalation for a three year delay from the current schedule as well as additional costs for Detail Design (18 month delay), Project Management and Construction Management due to the three year extension of the construction schedule.

4.4.2 Integrated Pre-treatment Schedule

The schedule for the integrated pre-treatment facility is shown in Figure 4-2. The critical activities for the integrated pre-treatment schedule are the preliminary design for integrated pre-treatment such that



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the pre-treatment design requirements can be integrated with the HWVP base design. The result of integrating pre-treatment with HWVP is an 18 month extension to the completion of Detailed Design and a three year delay in the start of construction.

From a budget authorization (BA) viewpoint, the integrated pre-treatment schedule funding profile requires construction funding in the second half of fiscal year 1993 which is the peak BA requirement for the current HWVP BA profile. The BA funding profiles for the integrated pre-treatment facility should be reviewed in additional detail.

4.5 Co-Located Pre-treatment Estimate and Schedule

4.5.1 Co-Located Pre-treatment Estimate

The co-located pre-treatment facility was estimated by combining HWVP with a co-located facility which would utilize existing HWVP services. The direct cost estimate for construction and procurement, including the estimate basis is shown in Table 4-4. Included behind Section 4.6 is a priced equipment list for the co-located pre-treatment alternative.

ITEM	LOCATION	QTY	CAPACITY	DIMENSION	MATERIAL	1982 \$ (15 x 1000)
DISSOLVER A	PROCESS CELL	1	42000 GAL	15" WIDE X 15.5" HIGH X 27" LONG	HASTELLOY C-276	2,135
DISSOLVER A TRANSFER PUMP A	PROCESS CELL	1			HASTELLOY C-276	246
DISSOLVER A TRANSFER PUMP B	PROCESS CELL	1			HASTELLOY C-276	246
DISSOLVER A AGITATOR A	PROCESS CELL	1			HASTELLOY C-276	506
DISSOLVER A AGITATOR B	PROCESS CELL	1			HASTELLOY C-276	506
DISSOLVER A SAMPLE PUMP A	PROCESS CELL	1			HASTELLOY C-276	201
DISSOLVER A CONDENSER/DE-ENTRAINER	PROCESS CELL	1	10 GPM	MODULE 15" WIDE X 15" HIGH X 20" LONG	STAINLESS STEEL	316
DISSOLVER A	PROCESS CELL	1	29000 GAL	15" WIDE X 15.5" HIGH X 20" LONG	SST 304L	622
DISSOLVER B TRANSFER PUMP A	PROCESS CELL	1			SST 304L	122
DISSOLVER B TRANSFER PUMP B	PROCESS CELL	1			SST 304L	100
DISSOLVER B AGITATOR A	PROCESS CELL	1			SST 304L	262
DISSOLVER B AGITATOR B	PROCESS CELL	1			SST 304L	262
DISSOLVER B	PROCESS CELL	1	42000 GAL	15" WIDE X 15.5" HIGH X 27" LONG	HASTELLOY C-276	2,135
DISSOLVER B TRANSFER PUMP A	PROCESS CELL	1			HASTELLOY C-276	246
DISSOLVER B TRANSFER PUMP B	PROCESS CELL	1			HASTELLOY C-276	246
DISSOLVER B AGITATOR A	PROCESS CELL	1			HASTELLOY C-276	506
DISSOLVER B AGITATOR B	PROCESS CELL	1			HASTELLOY C-276	506
DISSOLVER B SAMPLE PUMP A	PROCESS CELL	1			HASTELLOY C-276	201
DISSOLVER B CONDENSER/DE-ENTRAINER	PROCESS CELL	1	10 GPM	MODULE 15" WIDE X 15" HIGH X 20" LONG	STAINLESS STEEL	316
DISSOLVER B	PROCESS CELL	1	29000 GAL	15" WIDE X 15.5" HIGH X 20" LONG	SST 304L	622
DISSOLVER B TRANSFER PUMP A	PROCESS CELL	1			SST 304L	123
DISSOLVER B TRANSFER PUMP B	PROCESS CELL	1			SST 304L	253
DISSOLVER B AGITATOR A	PROCESS CELL	1			SST 304L	253
DISSOLVER B AGITATOR B	PROCESS CELL	1			SST 304L	253
DISSOLVER B SAMPLE PUMP B	PROCESS CELL	1			SST 304L	100

ITEM	LOCATION	QTY	CAPACITY	DIMENSION	MATERIAL	1982 \$ (\$ x 1000)
NO. 1 TOWER: 12 TOWERS, 6 A D X 20 H, W/ BUBBLE CAP TRAYS	PROCESS CELL	2		NO. 15 WIDE X 15 HIGH X 20 LONG	STAINLESS STEEL	94
NO. 2 TOWER TRANSFER PUMP A	PROCESS CELL	1				123
NO. 3 TOWER PUMP B	PROCESS CELL	1				123
RECOVERED NITRIC TANK	PROCESS CELL	1	32000 GAL	15 WIDE X 15.5 HIGH X 22 LONG	STAINLESS STEEL	652
RECOVERED NITRIC TANK TRANSFER PUMP A	PROCESS CELL	1				122
RECOVERED NITRIC TANK AGITATOR A	PROCESS CELL	1				253
RECOVERED NITRIC TANK AGITATOR B	PROCESS CELL	1				253
SUPERANTE FEED/RECEIVER A	PROCESS CELL	1	28000 GAL	15 WIDE X 15.5 HIGH X 20 LONG	STAINLESS STEEL	622
SUPERANTE FEED/RECEIVER A TRANSFER PUMP A	PROCESS CELL	1				122
SUPERANTE FEED/RECEIVER A AGITATOR A	PROCESS CELL	1				253
SUPERANTE FEED/RECEIVER A AGITATOR B	PROCESS CELL	1				253
SUPERANTE FEED/RECEIVER B	PROCESS CELL	1	28000 GAL	15 WIDE X 15.5 HIGH X 20 LONG	STAINLESS STEEL	622
SUPERANTE FEED/RECEIVER B TRANSFER PUMP A	PROCESS CELL	1				123
SUPERANTE FEED/RECEIVER B AGITATOR A	PROCESS CELL	1				253
SUPERANTE FEED/RECEIVER B AGITATOR B	PROCESS CELL	1				253
LOW LEVEL WASTE TANK A	PROCESS CELL	1	40000 GAL	15 WIDE X 15.5 HIGH X 27 LONG	STAINLESS STEEL	730
LOW LEVEL WASTE TANK A TRANSFER PUMP A	PROCESS CELL	1				123
LOW LEVEL WASTE TANK A AGITATOR A	PROCESS CELL	1				253
LOW LEVEL WASTE TANK A AGITATOR B	PROCESS CELL	1				253
LOW LEVEL WASTE TANK B	PROCESS CELL	1	40000 GAL	15 WIDE X 15.5 HIGH X 27 LONG	STAINLESS STEEL	730
LOW LEVEL WASTE TANK B TRANSFER PUMP A	PROCESS CELL	1				123
LOW LEVEL WASTE TANK B AGITATOR A	PROCESS CELL	1				253
LOW LEVEL WASTE TANK B AGITATOR B	PROCESS CELL	1				253

1055 \$

(\$ x 10000)

ITEM	LOCATION	QTY	CAPACITY	DIMENSION	MATERIAL	
CS PRODUCT STORAGE	PROCESS CELL	1	5000 GAL		STAINLESS STEEL	356
CS PRODUCT STORAGE TRANSFER PUMP A	PROCESS CELL	1				123
CS PRODUCT STORAGE AGITATOR A	PROCESS CELL	1				233
CS PROD RECEIVER	PROCESS CELL		1000 GAL		STAINLESS STEEL	233
CS PROD RECVR COOLING COIL	PROCESS CELL	1				66
CS PROD RECEIVER TRANSFER PUMP A	PROCESS CELL	1				123
CS PROD RECEIVER AGITATOR A	PROCESS CELL	1				233
1- PROD RECEIVER	PROCESS CELL	1	14000 GAL	13.5 DIA X 13.5 HIGH	STAINLESS STEEL	591
1- PROD RECEIVER COOLING COIL						66
1- PROD RECEIVER TRANSFER PUMP A	PROCESS CELL	1				123
1- ELUANT RECEIVER	PROCESS CELL	1	14000 GAL	13.5 DIA X 13.5 HIGH	STAINLESS STEEL	591
1- ELUANT REC-CLE COOLING COIL						66
1- ELUANT REC-CLE TRANSFER PUMP A	PROCESS CELL	1				123
1- ELUANT REC-CLE AGITATOR A	PROCESS CELL	1				233
1- PUMP TANK	PROCESS CELL	1	1000 GAL		STAINLESS STEEL	233
1- PUMP TANK COOLING COIL	PROCESS CELL	1				66
1- PUMP TANK TRANSFER PUMP A	PROCESS CELL	1				123
1- PUMP TANK AGITATOR A	PROCESS CELL	1				233
1- WASTE RECEIVER	PROCESS CELL		2000 GAL		STAINLESS STEEL	233
1- WASTE RECEIVER COOLING COIL						66
1- WASTE RECEIVER TRANSFER PUMP A	PROCESS CELL	1				123
1- WASTE RECEIVER AGITATOR A	PROCESS CELL	1				233
1- FEED STORAGE	PROCESS CELL	1	14000 GAL	13.5 DIA X 13.5 HIGH	STAINLESS STEEL	591
1- FEED STORAGE COOLING COIL						66
1- FEED STORAGE TRANSFER PUMP A	PROCESS CELL	1				123
1- FEED STORAGE AGITATOR A	PROCESS CELL	1				233
1- SUPP COLLECTION TANK	PROCESS CELL	1	5000 GAL	10 DIA X 10 HIGH	STAINLESS STEEL	396
1- SUPP CLCTN TANK COOLING COIL						66
1- SUPP COLLECTION TANK TRANSFER PUMP A	PROCESS CELL	1				123

ITEM	LOCATION	QTY	CAPACITY	DIMENSION	MATERIAL	1555 \$ 1000
SUMP COLLECTION TANK AGITATOR A	PROCESS CELL	1				253
NH3 OFFGAS SCRUBBER RELEV TANK	PROCESS CELL	1	4000 GAL	10' D X 7' H	STAINLESS STEEL	344
NH3 OFFGAS SCRUBB. RCY TK CL COIL						68
NH3 OFFGAS SCRUBBER RELEV TANK TRANSFER PUMP A	PROCESS CELL	1				123
NH3 OFFGAS SCRUBBER RELEV TANK AGITATOR A	PROCESS CELL	1				253
FEED WASTE UP TANK	PROCESS CELL	1	8000 GAL	10' DIA X 14' HIGH	STAINLESS STEEL	525
FEED WASTE UP TANK COOLING COIL						68
FEED WASTE UP TANK TRANSFER PUMP A	PROCESS CELL	1				123
FEED WASTE UP TANK AGITATOR A	PROCESS CELL	1				253
FEED PUMP TANK	PROCESS CELL	1	8000 GAL	10' DIA X 14' HIGH	STAINLESS STEEL	525
FEED PUMP TANK COOLING COIL						68
FEED PUMP TANK FEED PUMP A	PROCESS CELL	1				123
FEED PUMP TANK AGITATOR A	PROCESS CELL	1				253
WASTE RECEIVER TANK	PROCESS CELL	1	8000 GAL	10' DIA X 14' HIGH	STAINLESS STEEL	525
WASTE RECEIVER TANK COOLING COIL						68
WASTE RECEIVER TANK TRANSFER PUMP A	PROCESS CELL	1				123
WASTE RECEIVER TANK AGITATOR A	PROCESS CELL	1				253
SOLVENT FEED TANK	PROCESS CELL	1	4000 GAL	8' DIA X 10' HIGH	STAINLESS STEEL	344
SOLVENT FEED TANK COOLING COIL						68
SOLVENT FEED TANK FEED PUMP A	PROCESS CELL	1				123
SOLVENT FEED TANK AGITATOR A	PROCESS CELL	1				253
SOLVENT WASH WASTE TANK	PROCESS CELL	1	4000 GAL	8' DIA X 10' HIGH	STAINLESS STEEL	344
SOLVENT WASH WASTE TANK FEED PUMP A	PROCESS CELL	1				68
SOLVENT WASH WASTE TANK AGITATOR A	PROCESS CELL	1				123
SOLVENT STORAGE TANK	PROCESS CELL	1	4000 GAL	6' DIA X 10' HIGH	STAINLESS STEEL	344
SOLVENT STORAGE TANK COOLING COIL						68
SOLVENT STORAGE TANK TRANSFER PUMP A	PROCESS CELL	1				123
SOLVENT STORAGE TANK AGITATOR A	PROCESS CELL	1				253

ITEM	LOCATION	QTY	CAPACITY	DIMENSION	MATERIAL	1985 \$ 15 / 1000
TRO PRODUCT RECEIVER	PROCESS CELL	1	1400 GAL	5 DIA X 9' HIGH	STAINLESS STEEL	283
TRO PRODUCT RECVR COOLING COIL						68
TRO EFFLUENT RECEIVER	PROCESS CELL	1				123
TRANSFER PUMP A						
TRO CONCENTRATOR & STRIPPER (W/ PACER COL.)	PROCESS CELL	1	1400 GAL	8 DIA X 5' HIGH 1 DIA X 6' HIGH	HASTELLOY	316
TRO CONCENTRATOR CONDENSER	PROCESS CELL	1		10 X 5 LONG	STAINLESS STEEL	316
CONCENTRATED TRO RECEIVER A	PROCESS CELL	1	6000 GAL	10 DIA X 11 HIGH	STAINLESS STEEL	442
CONTROL TRL FCVR A COOLING COIL						68
CONCENTRATED TRO RECEIVER A TRANSFER PUMP A	PROCESS CELL	1				123
CONCENTRATED TRO RECEIVER A AGITATOR A	PROCESS CELL	1				251
CONCENTRATED TRO RECEIVER E	PROCESS CELL	1	6000 GAL	10 DIA X 11 HIGH	STAINLESS STEEL	442
CONTROL TRO FCVR E COOLING COIL						68
CONCENTRATED TRO RECEIVER E TRANSFER PUMP A	PROCESS CELL	1				123
CONCENTRATED TRO RECEIVER B AGITATOR A	PROCESS CELL	1				251
TRO CONDENSATE RECEIVER	PROCESS CELL	1	3000 GAL	8 DIA X 10 HIGH	STAINLESS STEEL	300
TRO CONDENSATE RECVR COOLING COIL						68
TRO CONDENSATE RECEIVER TRANSFER PUMP A	PROCESS CELL	1				123
TRO CONDENSATE RECEIVER AGITATOR A	PROCESS CELL	1				251
REGENERATION WASTE TANK	PROCESS CELL	1	1000 GAL	4 DIA X 10 HIGH	STAINLESS STEEL	232
REGENERATION WASTE T1 COOLING COIL						68
PHF FILTER A	PROCESS CELL	1	20 GPH	20 X 8 LONG	STAINLESS STEEL	316
PHF FILTER B	PROCESS CELL	1	20 GPH	20 X 8 LONG	STAINLESS STEEL	316
PRECODAT FEED TANK	PROCESS CELL	1	1000 GAL	4 DIA X 10 HIGH	STAINLESS STEEL	232
PRECODAT FEED TANK COOLING COIL						68
PRECODAT FEED TANK TRANSFER PUMP A	PROCESS CELL	1				123
PRECODAT FEED TANK AGITATOR A	PROCESS CELL	1				251
WMS SCRAPER CONCENTRATOR RECVR AGITATOR A	PROCESS CELL	1	1000 GAL	5 DIA X 7 HIGH	STAINLESS STEEL	232
WMS SCRAPER CONCN RCVR COOL COIL						68
WMS SCRAPER CONCENTRATOR RECVR TRANSFER PUMP A	PROCESS CELL	1				123
WMS SCRAPER CONCENTRATOR RECVR AGITATOR A	PROCESS CELL	1				251

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ITEM	LOCATION	QTY	CAPACITY	DIMENSION	MATERIAL	1982 \$ (\$ x 1000)
AMP SCREWDRIVER CONDENSATE RECVR	PROCESS CELL	1	4000 GAL	10' D X 7' H	STAINLESS STEEL	345
AMP STRIP INWASH REL COOL COIL						65
AMP SCREWDRIVER CONDENSATE RECVR TRANSFER PUMP A	PROCESS CELL	1				120
AMP SCREWDRIVER CONDENSATE RECVR ASISTATION A	PROCESS CELL	1				250
TRIPLE EXTRACTION MODULE EXTRACTOR CENTRIFUGAL CONTACTORS	PROCESS CELL	1		MODULE 4' W X 12' L X 8' H	STAINLESS STEEL	194
TRIPLE STAGE MODULE SCREW CENTRIFUGAL CONTACTORS	PROCESS CELL	1		MODULE 4' W X 8' L X 8' H	STAINLESS STEEL	135
TRIPLE STAGE MODULE STRIP CENTRIFUGAL CONTACTORS	PROCESS CELL	1		MODULE 4' W X 10' L X 8' H	STAINLESS STEEL	166
TRIPLE STAGE WASH MODULE WASH CENTRIFUGAL CONTACTORS	PROCESS CELL	1		MODULE 2' W X 10' L X 8' H	STAINLESS STEEL	111
17 SOLVENT COLUMN	PROCESS CELL	1		1' D X 6' H	STAINLESS STEEL	6
17 COLUMN	PROCESS CELL	1	3000 GAL	6' D X 15' H	STAINLESS STEEL	107
16 CONCENTRATOR	PROCESS CELL	1	10 GPM	15" H	STAINLESS STEEL	362
16 CONCENTRATION CONDENSER	PROCESS CELL	1		2' D X 6' L	STAINLESS STEEL	216
AMP SCREWDRIVER SOLUTION CONCENTRATION	PROCESS CELL	1	20 GPM	15" H	STAINLESS STEEL	514
AMP OFF-GAS SCREWDRIVER W BUBBLE CAP TANKS	PROCESS CELL	1		6' D X 12' H	STAINLESS STEEL	107
AMP SCREWDRIVER CONCENTRATION CONDENSER	PROCESS CELL	1	20 GPM	3' D X 7' H	STAINLESS STEEL	314
OFF-GAS HEATER	PROCESS CELL	1	1500 SCFH		STAINLESS STEEL	16
OFF-GAS FILTER	PROCESS CELL	1	1500 SCFH		STAINLESS STEEL	230
TANK JETS	PROCESS CELL	30			STAINLESS STEEL	15
SUMP JETS	PROCESS CELL	6	25 GPM		STAINLESS STEEL	7
TOTAL IN-CELL EQUIPMENT						39,725
SCUB SOLUTION FEED TANK	IN BUILD/OUT-OF-CELL	1	500 GAL	4' 6" DIA X 5' H	STAINLESS STEEL	18
SCUB SOLUTION FEED TANK TRANSFER PUMP A	IN BUILD/OUT-OF-CELL	1				4
SCUB SOLUTION FEED TANK AGITATOR A	IN BUILD/OUT-OF-CELL	1				4
STRIP SOLUTION FEED TANK	IN BUILD/OUT-OF-CELL	1	500 GAL	4' 6" DIA X 5' H	STAINLESS STEEL	16

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ITEM	LOCATION	QTY	CAPACITY	DIMENSION	MATERIAL	1995 \$ (5 - 1995)
PRE-COM FEED TANK TRANSFER PUMP A	IN BLDG/OUT-OF-CELL	1				4
PRE-COM FEED TANK AGITATOR A	IN BLDG/OUT-OF-CELL	1				4
12M NITRIC ACID ADDITION TANK TRANSFER PUMP A	IN BLDG/OUT-OF-CELL	1	500 GAL	4' 6" DIA X 5' H	STAINLESS STEEL	16
12M NITRIC ACID ADDITION TANK AGITATOR A	IN BLDG/OUT-OF-CELL	1				4
PEROXIDE FEED TANK	IN BLDG/OUT-OF-CELL	1	500 GAL	4' 6" DIA X 5' H	STAINLESS STEEL	16
PEROXIDE FEED TANK TRANSFER PUMP A	IN BLDG/OUT-OF-CELL	1				4
PEROXIDE FEED TANK AGITATOR A	IN BLDG/OUT-OF-CELL	1				4
SILURSE RECEIVER SODIUM NITRITE ADDITION TANK	IN BLDG/OUT-OF-CELL	1	500 GAL	4' 6" DIA X 5' H	STAINLESS STEEL	16
STORAGE RECEIVER SODIUM NITRITE ADDITION TANK-PUMP A	IN BLDG/OUT-OF-CELL	1				4
SILURSE RECEIVER SODIUM NITRITE ADDITION TANK-AGITATOR A	IN BLDG/OUT-OF-CELL	1				4
LOW LEVEL WASTE TANK SODIUM NITRITE ADDITION TANK	IN BLDG/OUT-OF-CELL	1	500 GAL	4' 6" DIA X 5' H	STAINLESS STEEL	16
LOW LEVEL WASTE TANK SODIUM NITRITE ADDITION TANK-TRANSFER PUMP A	IN BLDG/OUT-OF-CELL	1				4
LOW LEVEL WASTE TANK SODIUM NITRITE ADDITION TANK-AGITATOR A	IN BLDG/OUT-OF-CELL	1				4
12M NITRIC ACID ADDITION TANK (CS)	IN BLDG/OUT-OF-CELL	1	500 GAL	4' 6" DIA X 5' H	STAINLESS STEEL	16
12M NITRIC ACID ADDITION TANK TRANSFER PUMP A	IN BLDG/OUT-OF-CELL	1				4
12M NITRIC ACID ADDITION TANK AGITATOR A	IN BLDG/OUT-OF-CELL	1				4
OFF-GAS TREATMENT SODIUM NITRITE TANK	IN BLDG/OUT-OF-CELL	1	500 GAL	4' 6" DIA X 5' H	STAINLESS STEEL	16
OFF-GAS TREATMENT SODIUM NITRITE TANK - TRANSFER PUMP A	IN BLDG/OUT-OF-CELL	1				4
OFF-GAS TREATMENT SODIUM NITRITE TANK - AGITATOR A	IN BLDG/OUT-OF-CELL	1				4
UTILITY TANK TRANSFER PUMP A	IN BLDG/OUT-OF-CELL	1	500 GAL	4' 6" DIA X 5' H	STAINLESS STEEL	16
UTILITY TANK AGITATOR A	IN BLDG/OUT-OF-CELL	1				4
12M NITRIC ACID ADDITION TANK TRANSFER PUMP A	IN BLDG/OUT-OF-CELL	1	500 GAL	4' 6" DIA X 5' H	STAINLESS STEEL	16
12M NITRIC ACID ADDITION TANK AGITATOR A	IN BLDG/OUT-OF-CELL	1				4

ITEM	LOCATION	QTY	CAPACITY	DIMENSION	MATERIAL	1982 \$ (5 x 1000)	
CHOC MIX TAN/ TRANSFER PUMP A	NOT IN BLDG/ OUT-OF-CELL	1	500 GAL	4'6" D X 5'0" HIGH	STAINLESS STEEL	12	
CHOC MIX TAN/ AGITATOR A	NOT IN BLDG/ OUT-OF-CELL	1				4	
SOLVENT MIX TAN/ TRANSFER PUMP A	NOT IN BLDG/ OUT-OF-CELL	1	500 GAL	4'6" D X 5'0" HIGH	STAINLESS STEEL	16	
SOLVENT MIX TAN/ AGITATOR A	NOT IN BLDG/ OUT-OF-CELL	1				4	
NITRIC ACID DILUTION TAN/ TRANSFER PUMP A	NOT IN BLDG/ OUT-OF-CELL	3	500 GAL	4'6" D X 5'0" HIGH	STAINLESS STEEL	16	
NITRIC ACID DILUTION TAN/ AGITATOR A	NOT IN BLDG/ OUT-OF-CELL	3				4	
SODIUM HYDROXIDE DILUTION TAN/ TRANSFER PUMP A	NOT IN BLDG/ OUT-OF-CELL	2	500 GAL	4'6" D X 5'0" HIGH	STAINLESS STEEL	18	
SODIUM HYDROXIDE DILUTION TAN/ TRANSFER PUMP A	NOT IN BLDG/ OUT-OF-CELL	2				4	
SODIUM HYDROXIDE DILUTION TAN/ AGITATOR A	NOT IN BLDG/ OUT-OF-CELL	2				4	
SECTION NITRIC MIX TAN/ TRANSFER PUMP A	NOT IN BLDG/ OUT-OF-CELL	1	500 GAL	4'6" D X 5'0" HIGH	STAINLESS STEEL	18	
SECTION NITRIC MIX TAN/ AGITATOR A	NOT IN BLDG/ OUT-OF-CELL	1				4	
SECTION NITRIC MIX TAN/ TRANSFER PUMP A	NOT IN BLDG/ OUT-OF-CELL	1	500 GAL	4'6" D X 5'0" HIGH	STAINLESS STEEL	18	
SECTION NITRIC MIX TAN/ AGITATOR A	NOT IN BLDG/ OUT-OF-CELL	1				4	
SECTION NITRIC MIX TAN/ TRANSFER PUMP A	NOT IN BLDG/ OUT-OF-CELL	1				4	
SECTION NITRIC MIX TAN/ AGITATOR A	NOT IN BLDG/ OUT-OF-CELL	1				4	
TOTAL COLD CHEMICAL OUT OF BLDG							1,210
REG MAINTENANCE EQUIPMENT	REG MAINT SHOP	LOT				568	
NON-REG MAINTENANCE EQUIPMENT	NON-REG SHOP	LOT				178	
MSH REPAIR EQUIPMENT	MSH REPAIR	LOT				164	
TOTAL REGULATED, NON-REGULATED & MSH REPAIR							910

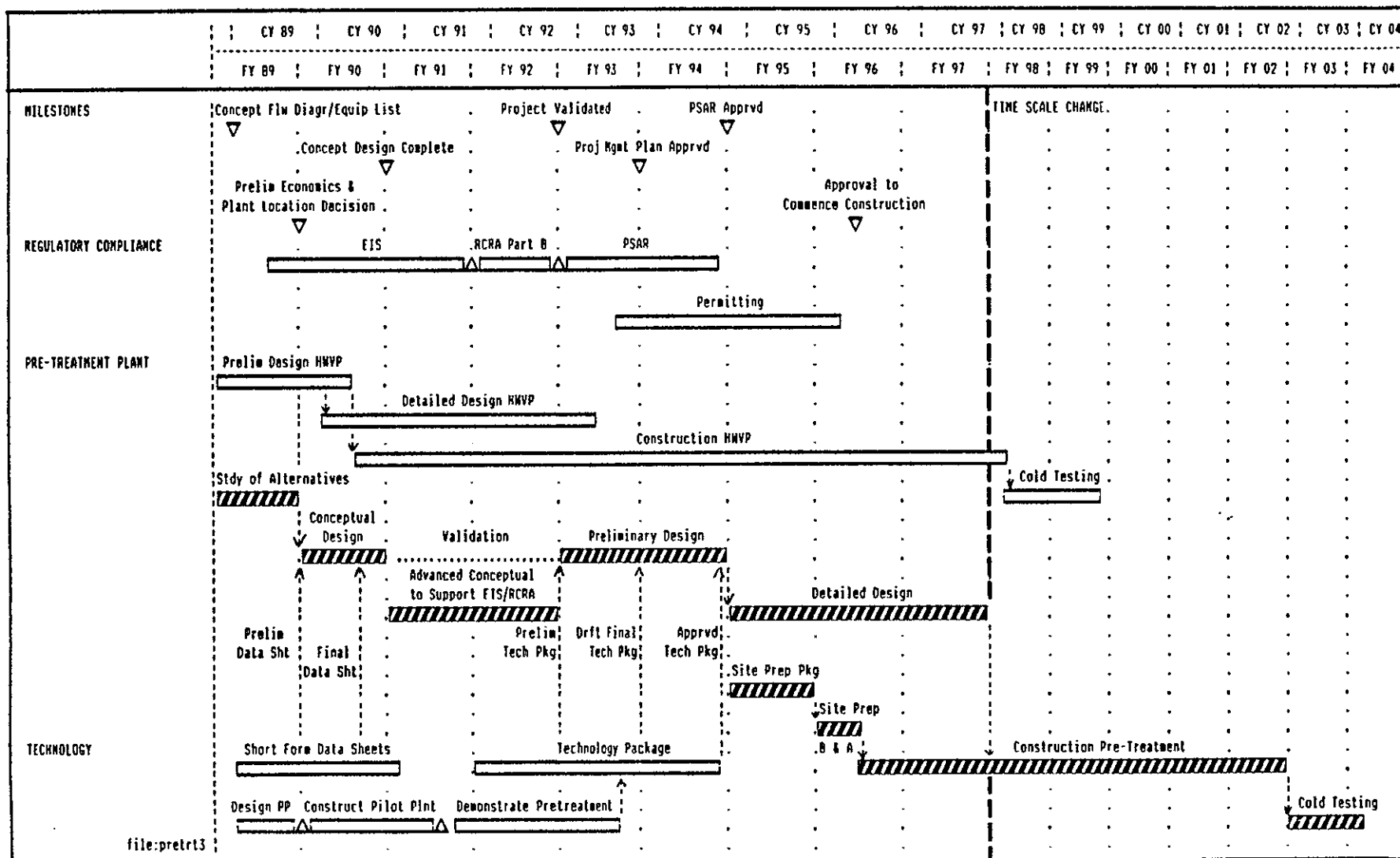
1988 \$

ITEM	LOCATION	QTY	CAPACITY	DIMENSION	MATERIAL	(8' x 100')	
PNEUMATIC TRANSFER SYSTEM	ANALYTICAL CELLS	4		2"	STAINLESS STEEL	1,645	
DECON GLOW BOX	REM REPAIR	1			STAINLESS STEEL	76	
CMA DECON EQUIPMENT		LOT				55	
TOTAL EQUIPMENT DECON REPAIR & MAINTENANCE							1,776
TRANSFER DRUMS	SAMPLE/ANALYT ROOM	4		2' x 2' x 2'	STAINLESS STEEL	655	
SAMPLE MODULES	SAMPLE CELLS	35	15 ML		STAINLESS STEEL	2,205	
TOTAL PROCESS SAMPLES							2,895
HOT LAB EQUIPMENT	HOT LAB	LOT			STAINLESS STEEL	1,208	
COLD LAB EQUIPMENT	COLD LAB	LOT				103	
TOTAL ANALYTICAL FACILITIES							1,911
CEPHE	CANTON OUT-OF-CELL	1	30 TON	75' x 11' x 20'	CARBON STEEL	785	
50" SHIELD KINCONE	MAINT. REMOTE CELLS	6			LEAD BRASS	789	
25" SHIELD KINCONE	SAMPLE REMOTE CELLS	10			LEAD BRASS	774	
MASTER SLAVE MANIPULATORS	VARIABLE REMOTE CELLS	32	MODEL F		STAINLESS STEEL	1,765	
ELECT MECH MANIPULATORS	REMOTE MAIN CELLS	3	FAB 3000		STAINLESS STEEL	2,165	
REM CRANE	REM REPAIR	3	SINGLE		CARBON STEEL	73	
SHIELD WINDOW (CR)	MAINT AREA	1			CARBON STEEL	156	
CEPHE CRANE	CDMC	1	7.5 TON		CARBON STEEL	1,218	
CRS SHIELD LOCK ROTIST	CRS				STAINLESS STEEL	653	
CRANE BLOODS, YOLDS, & BAILS	CANTON	LOT	30 TON		STAINLESS STEEL	263	
CUT-UP ROOM EQUIPMENT	CUT-UP ROOM	LOT				1,122	
FECHA REMOTE LIGHTS	FECHA	4			STAINLESS STEEL	31	
TOTAL REMOTE HANDLING EQUIPMENT							9,837
TOTAL GRAND, ALL EQUIPMENT							55,759

TABLE 4-2. STAND-ALONE FACILITY CONSTRUCTION COST ESTIMATE SUMMARY & BASIS

COST CATEGORIES	DIRECT COST X 1,000 (1988 \$)	ESTIMATE BASIS
Temporary Construction	\$2,500	Allowance of 80% of HWVP temporary construction
Site Prep	\$960	Allowance of 80% of HWVP site prep, MTO for clearing
Structures	\$59,528	Quantities based on drawing MTO Applied HWVP unit installation rates
Fire Protection/Detection	\$2,000	Allowance of two times HWVP RCD estimate for Vit Bldg
HVAC	\$14,629	Vendor quotes for supply and exhaust fans and HEPA filter plenums Robot system added from PFM facility escalated to 1988 Equipment factored ductwork and dampers/diffusers Cooling tower included with utilities Stack included with structure
In-Cell Pipe	\$14,888	Jumpers - MTO based on equipment count Embeds factored using HWVP data Hot pipe trench MTO
Electrical Supply	\$1,593	MTO allowance from HWVP
Electrical Distribution	\$5,720	Capacity factored from HWVP
Process Utilities	\$18,159	Capacity factored from HWVP
DCS System	\$12,896	Equipment factored from PFM Installation factored from HWVP
HP System	\$10,560	Equipment factored from HWVP
Communications	\$250	Allowance from HWVP RCD estimate
Remote Handling, Sampling, Analytical & Maint Repair	\$21,352	Equipment factored estimate, see priced equipment list
Process Equipment:		
In-Cell Equipment	\$50,292	Equipment factored estimate, see priced equipment list
Cold Chemical - In Bldg	\$4,123	Equipment factored estimate, see priced equipment list
Cold Chemical - Out of Bldg	\$6,685	Equipment factored estimate, see priced equipment list
Construction Startup	\$2,288	Factored from HWVP direct construction costs
Operations Control Building	\$0	
TOTAL DIRECT COST	\$228,423	

FIGURE 4-1
PRE-TREATMENT PLANT SCHEDULE
STAND ALONE



ITEM	LOCATION	QTY	CAPACITY	DIMENSION	MATERIAL	1992 \$ \$ x 1000
DISSOLVER A	PROCESS CELL	1	12000 GAL	15' WIDE X 15.5' HIGH X 27' LONG	HASTELLOY C-276	2,135
DISSOLVER A TRANSFER PUMP A	PROCESS CELL	1			HASTELLOY C-276	240
DISSOLVER A TRANSFER PUMP B	PROCESS CELL	1			HASTELLOY C-276	240
DISSOLVER A AGITATOR A	PROCESS CELL	1			HASTELLOY C-276	500
DISSOLVER A AGITATOR B	PROCESS CELL	1			HASTELLOY C-276	500
DISSOLVER A SAMPLE PUMP A	PROCESS CELL	1			HASTELLOY C-276	201
DISSOLVER A CONDENSER DE-ENTRAINER	PROCESS CELL	1	10 GPM	MODULE 15' WIDE X 15' HIGH X 20' LONG	STAINLESS STEEL	110
SLUDGE RECEIVER A	PROCESS CELL	1	25000 GAL	15' WIDE X 15.5' HIGH X 20' LONG	SST 304L	600
SLUDGE RECEIVER A TRANSFER PUMP A	PROCESS CELL	1			SST 304L	122
SLUDGE RECEIVER A SAMPLE PUMP A	PROCESS CELL	1			SST 304L	100
SLUDGE RECEIVER A AGITATOR A	PROCESS CELL	1			SST 304L	253
SLUDGE RECEIVER A AGITATOR B	PROCESS CELL	1			SST 304L	253
DISSOLVER B	PROCESS CELL	1	12000 GAL	15' WIDE X 15.5' HIGH X 27' LONG	HASTELLOY C-276	2,135
DISSOLVER B TRANSFER PUMP A	PROCESS CELL	1			HASTELLOY C-276	240
DISSOLVER B TRANSFER PUMP B	PROCESS CELL	1			HASTELLOY C-276	240
DISSOLVER B AGITATOR A	PROCESS CELL	1			HASTELLOY C-276	500
DISSOLVER B AGITATOR B	PROCESS CELL	1			HASTELLOY C-276	500
DISSOLVER B SAMPLE PUMP A	PROCESS CELL	1			HASTELLOY C-276	201
DISSOLVER B CONDENSER/DE-ENTRAINER	PROCESS CELL	1	10 GPM	MODULE 15' WIDE X 15' HIGH X 20' LONG	STAINLESS STEEL	110
SLUDGE RECEIVER B	PROCESS CELL	1	25000 GAL	15' WIDE X 15.5' HIGH X 20' LONG	SST 304L	622
SLUDGE RECEIVER B TRANSFER PUMP A	PROCESS CELL	1			SST 304L	123
SLUDGE RECEIVER B AGITATOR A	PROCESS CELL	1			SST 304L	253
SLUDGE RECEIVER B AGITATOR B	PROCESS CELL	1			SST 304L	253
SLUDGE RECEIVER B SAMPLE PUMP A	PROCESS CELL	1			SST 304L	100

ITEM	LOCATION	QTY	CAPACITY	DIMENSION	MATERIAL	1982 \$ * 1000
NO. 1 TONNAGE 12 TONNAGE @ 4 D 1 20" H. W/ BUOY (C/F TAP-13)	PROCESS CELL	2		MIDDLE 15" WIDE X 15" HIGH X 20" LONG	STAINLESS STEEL	94
NO. 2 TONNAGE TRANSFER PUMP A	PROCESS CELL	1				127
NO. 3 TONNAGE PUMP B	PROCESS CELL	1				123
RECOVERED WASTE TANK	PROCESS CELL	1	32000 GAL.	15" WIDE X 15.5" HIGH X 22" LONG	STAINLESS STEEL	650
RECOVERED NITRIC TANK TRANSFER PUMP A	PROCESS CELL	1				123
RECOVERED NITRIC TANK AGITATOR A	PROCESS CELL	1				267
RECOVERED NITRIC TANK AGITATOR B	PROCESS CELL	1				253
SUPERWASTE FEED RECEIVER A TRANSFER PUMP A	PROCESS CELL	1	28000 GAL.	15" WIDE X 15.5" HIGH X 20" LONG	STAINLESS STEEL	621
SUPERWASTE FEED RECEIVER A AGITATOR A	PROCESS CELL	1				123
SUPERWASTE FEED RECEIVER A AGITATOR B	PROCESS CELL	1				253
SUPERWASTE FEED RECEIVER B	PROCESS CELL	1	28000 GAL.	15" WIDE X 15.5" HIGH X 20" LONG	STAINLESS STEEL	622
SUPERWASTE FEED RECEIVER B TRANSFER PUMP A	PROCESS CELL	1				123
SUPERWASTE FEED RECEIVER B AGITATOR A	PROCESS CELL	1				253
SUPERWASTE FEED RECEIVER B AGITATOR B	PROCESS CELL	1				253
LOW LEVEL WASTE TANK A TRANSFER PUMP A	PROCESS CELL	1				123
LOW LEVEL WASTE TANK A AGITATOR A	PROCESS CELL	1				253
LOW LEVEL WASTE TANK A AGITATOR B	PROCESS CELL	1				253
LOW LEVEL WASTE TANK B	PROCESS CELL	1	40000 GAL.	15" WIDE X 15.5" HIGH X 27" LONG	STAINLESS STEEL	730
LOW LEVEL WASTE TANK B TRANSFER PUMP A	PROCESS CELL	1				123
LOW LEVEL WASTE TANK B AGITATOR A	PROCESS CELL	1				253
LOW LEVEL WASTE TANK B AGITATOR B	PROCESS CELL	1				253

ITEM	LOCATION	QTY	CAPACITY	DIMENSION	MATERIAL	1985 \$
05 PRODUCT STORAGE	PROCESS CELL	1	5000 GAL		STAINLESS STEEL	350
06 FEED STORAGE TRANSFER PUMP A	PROCESS CELL	1				120
06 PRODUCT STORAGE AGITATOR A	PROCESS CELL	1				250
06 PROD RECEIVER	PROCESS CELL		1000 GAL		STAINLESS STEEL	220
06 PROD RECVR COOLING COIL	PROCESS CELL	1				65
06 PROD RECEIVER TRANSFER PUMP A	PROCESS CELL	1				100
06 PROD RECEIVER AGITATOR A	PROCESS CELL	1				250
06 PROD RECEIVER	PROCESS CELL	1	14000 GAL	13' 5" DIA X 15' 5" HIGH	STAINLESS STEEL	500
06 PROD RECEIVER COOLING COIL	PROCESS CELL					60
06 PROD RECEIVER TRANSFER PUMP A	PROCESS CELL	1				120
06 ELUANT RECICLE	PROCESS CELL	1	14000 GAL	13' 5" DIA X 15' 5" HIGH	STAINLESS STEEL	590
06 ELUANT RECICLE COOLING COIL	PROCESS CELL					60
06 ELUANT RECICLE TRANSFER PUMP A	PROCESS CELL	1				120
06 ELUANT RECICLE AGITATOR A	PROCESS CELL	1				250
06 PUMP TANK	PROCESS CELL	1	1000 GAL		STAINLESS STEEL	270
06 PUMP TANK COOLING COIL	PROCESS CELL					60
06 PUMP TANK TRANSFER PUMP A	PROCESS CELL	1				120
06 PUMP TANK AGITATOR A	PROCESS CELL	1				250
06 WASTE RECEIVER	PROCESS CELL		2000 GAL		STAINLESS STEEL	220
06 WASTE RECEIVER COOLING COIL	PROCESS CELL					60
06 WASTE RECEIVER TRANSFER PUMP A	PROCESS CELL	1				120
06 WASTE RECEIVER AGITATOR A	PROCESS CELL	1				250
06 FEED STORAGE	PROCESS CELL	1	14000 GAL	13' 5" DIA X 15' 5" HIGH	STAINLESS STEEL	590
06 FEED STORAGE COOLING COIL	PROCESS CELL					60
06 FEED STORAGE TRANSFER PUMP A	PROCESS CELL	1				120
06 FEED STORAGE AGITATOR A	PROCESS CELL	1				250
06 SUPP COLLECTION TANK	PROCESS CELL	1	5000 GAL	10' DIA X 10' HIGH	STAINLESS STEEL	370
06 SUPP CLCTN TANK COOLING COIL	PROCESS CELL					60
06 SUPP COLLECTION TANK TRANSFER PUMP A	PROCESS CELL	1				120

ITEM	LOCATION	QTY	CAPACITY	DIMENSION	MATERIAL	1995 \$
SOLVENT COLLECTION TANK AGITATOR A	PROCESS CELL	1				257
WASH OFFERS SCUMMER FEED TANK AGITATOR A	PROCESS CELL	1	4000 GAL	10 F X 7 H	STAINLESS STEEL	746
WASH OFFER SCUMPER RCV TO CL COIL						58
WASH OFFERS SCUMMER FEED TANK TRANSFER PUMP A	PROCESS CELL	1				127
WASH OFFERS SCUMMER FEED TANK AGITATOR A	PROCESS CELL	1				257
FEED RATE UP TANK	PROCESS CELL	1	8000 GAL	10 DIA X 14 HIGH	STAINLESS STEEL	525
FEED RATE UP TANK COOLING COIL						68
FEED RATE UP TANK TRANSFER PUMP A	PROCESS CELL	1				127
FEED RATE UP TANK AGITATOR A	PROCESS CELL	1				257
FEED PUMP TANK	PROCESS CELL	1	8000 GAL	10 DIA X 14 HIGH	STAINLESS STEEL	525
FEED PUMP TANK COOLING COIL						68
FEED PUMP TANK FEED PUMP A	PROCESS CELL	1				127
FEED PUMP TANK AGITATOR A	PROCESS CELL	1				257
WASTE FEEDLINE TANK	PROCESS CELL	1	8000 GAL	10 DIA X 14 HIGH	STAINLESS STEEL	525
WASTE RECEIVER TO COOLING COIL						68
WASTE RECEIVER TANK TRANSFER PUMP A	PROCESS CELL	1				127
WASTE RECEIVER TANK AGITATOR A	PROCESS CELL	1				257
SOLVENT FEED TANK	PROCESS CELL	1	4000 GAL	8 DIA X 10 HIGH	STAINLESS STEEL	746
SOLVENT FEED TANK COOLING COIL						68
SOLVENT FEED TANK FEED PUMP A	PROCESS CELL	1				127
SOLVENT FEED TANK AGITATOR A	PROCESS CELL	1				257
SOLVENT WASH WASTE TANK	PROCESS CELL	1	4000 GAL	8 DIA X 10 HIGH	STAINLESS STEEL	746
SOLVENT WASH WET TO COOLING COIL						68
SOLVENT WASH WASTE TANK FEED PUMP A	PROCESS CELL	1				127
SOLVENT WASH WASTE TANK AGITATOR A	PROCESS CELL	1				257
SOLVENT STORAGE TANK	PROCESS CELL	1	4000 GAL	8 DIA X 10 HIGH	STAINLESS STEEL	746
SOLVENT STORAGE TO COOLING COIL						68
SOLVENT STORAGE TANK TRANSFER PUMP A	PROCESS CELL	1				127
SOLVENT STORAGE TANK AGITATOR A	PROCESS CELL	1				257

ITEM	LOCATION	QTY	CAPACITY	DIMENSION	MATERIAL	1985 \$ @ 1000
TWO PRODUCT RECEIVER	PROCESS CELL	1	1400 GAL	8' DIA X 9' HIGH	STAINLESS STEEL	257
TWO PRODUCT RECVR COOLING COIL						66
TWO PRODUCT RECEIVER TRANSFER PUMP A	PROCESS CELL	1				123
TWO CONCENTRATE & STRIFFER (W. PAPER COIL)	PROCESS CELL	1	1400 GAL	8' DIA X 9' HIGH	WASTELLOY	216
TWO CONCENTRATE CONDENSER	PROCESS CELL	1		16' X 5' LONG	STAINLESS STEEL	216
CONCENTRATE TWO RECEIVER A	PROCESS CELL	1	6000 GAL	10' DIA X 11' HIGH	STAINLESS STEEL	442
CONCENTRATE TWO ACUR A COOLING COIL						56
CONCENTRATE TWO RECEIVER A TRANSFER PUMP A	PROCESS CELL	1				123
CONCENTRATE TWO RECEIVER A AGITATOR A	PROCESS CELL	1				250
CONCENTRATE TWO RECEIVER B	PROCESS CELL	1	5000 GAL	10' DIA X 11' HIGH	STAINLESS STEEL	442
CONCENTRATE TWO ACUR B COOLING COIL						66
CONCENTRATE TWO RECEIVER B TRANSFER PUMP A	PROCESS CELL	1				123
CONCENTRATE TWO RECEIVER B AGITATOR A	PROCESS CELL	1				257
TWO CONCENTRATE RECEIVER	PROCESS CELL	1	3000 GAL	8' DIA X 10' HIGH	STAINLESS STEEL	302
TWO CONCENTRATE RECVR COOLING COIL						68
TWO CONCENTRATE RECEIVER TRANSFER PUMP A	PROCESS CELL	1				123
TWO CONCENTRATE RECEIVER AGITATOR A	PROCESS CELL	1				257
REGENERATION WASTE TANK	PROCESS CELL	1	1000 GAL	4' DIA X 10' HIGH	STAINLESS STEEL	222
REGENERATION WASTE T1 COOLING COIL						68
PHI FILTER A	PROCESS CELL	1	20 GPM	2' D X 8' LONG	STAINLESS STEEL	216
PHI FILTER B	PROCESS CELL	1	20 GPM	2' D X 8' LONG	STAINLESS STEEL	216
PREDIST FEED TANK	PROCESS CELL	1	1000 GAL	4' D X 10' H	STAINLESS STEEL	222
PREDIST FEED TANK COOLING COIL						68
PREDIST FEED TANK TRANSFER PUMP A	PROCESS CELL	1				123
PREDIST FEED TANK AGITATOR A	PROCESS CELL	1				253
PHI SQUEEZE CONCENTRATE RECVR	PROCESS CELL	1	1000 GAL	5' D X 7' H	STAINLESS STEEL	222
PHI SQUEEZE CONCENTRATE RECVR AGITATOR A						68
PHI SQUEEZE CONCENTRATE RECVR TRANSFER PUMP A	PROCESS CELL	1				123
PHI SQUEEZE CONCENTRATE RECVR AGITATOR A	PROCESS CELL	1				253

ITEM	LOCATION	QTY	CAPACITY	DIMENSION	MATERIAL	1985 \$ @ 1000
NR1 SCRAMBLER CONDENSATE RECOVER	PROCESS CELL	1	4000 GAL	10 D X 7 H	STAINLESS STEEL	346
NR2 SCRA- CONDENSED REC COOL COIL						62
NR3 SCRAMBLER CONDENSATE RECOVER TRANSFER PUMP A	PROCESS CELL	1				127
NR4 SCRAMBLER CONDENSATE RECOVER AGITATOR A	PROCESS CELL	1				297
TR1 EXTRACTOR MODULE EXTRACTOR CENTRIFUGAL CONTACTORS	PROCESS CELL	1		MODULE 4 W X 12 L X 8 H	STAINLESS STEEL	154
TR2 SCRA MODULE SCRA CENTRIFUGAL CONTACTORS	PROCESS CELL	1		MODULE 4 W X 12 L X 8 H	STAINLESS STEEL	175
TR3 SCRAMBLER MODULE SCRA CENTRIFUGAL CONTACTORS	PROCESS CELL	1		MODULE 4 W X 10 L X 8 H	STAINLESS STEEL	106
TR4 SCRAMBLER MODULE SCRA CENTRIFUGAL CONTACTORS	PROCESS CELL	1		MODULE 2 W X 10 L X 8 H	STAINLESS STEEL	111
TD SOLVENT COLUMN	PROCESS CELL	1		10 D X 6 H	STAINLESS STEEL	4
TD COLUMN	PROCESS CELL	1	3000 GAL	6 D X 15 H	STAINLESS STEEL	107
CG CONCENTRATOR	PROCESS CELL	1	10 GPM	15 H	STAINLESS STEEL	362
CG CONCENTRATOR OR CONDENSED	PROCESS CELL	1		21 X 6 L	STAINLESS STEEL	316
NR1 SCRAMBLER SOLUTION CONCENTRATOR	PROCESS CELL	1	20 GPM	15 H	STAINLESS STEEL	514
NR2 SCRAMBLER SOLUTION WHEELS OR TRAYS	PROCESS CELL	1		6 L X 12 H	STAINLESS STEEL	107
NR3 SCRAMBLER CONDENSATE CONDENSED	PROCESS CELL	1	20 GPM	2 D X 7 H	STAINLESS STEEL	316
OFF-GAS HEATER	PROCESS CELL	1	1500 SCFH		STAINLESS STEEL	16
OFF-GAS FILTER	PROCESS CELL	1	1500 SCFH		STAINLESS STEEL	230
TANK JETS	PROCESS CELL	30			STAINLESS STEEL	15
SUMP JETS	PROCESS CELL	6	25 GPM		STAINLESS STEEL	7
TOTAL IN-CELL EQUIPMENT						39,725
SCRA SOLUTION FEED TANK	IN BLDG/OUT-OF-CELL	1	500 GAL	4' 6" DIA X 3' H	STAINLESS STEEL	16
STEEL SOLUTION FEED TANK TRANSFER PUMP A	IN BLDG/OUT-OF-CELL	1				4
SCRA SOLUTION FEED TANK AGITATOR A	IN BLDG/OUT-OF-CELL	1				4
STEEL SOLUTION FEED TANK	IN BLDG/OUT-OF-CELL	1	500 GAL	4' 6" DIA X 3' H	STAINLESS STEEL	16

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INTERFERED CASE - WASTE TREATMENT PLANT

ITEM	LOCATION	QTY	CAPACITY	DIMENSION	MATERIAL	1985 \$ @ 1000
STEEL SOLUTION FEED TANK TRANSFER PUMP A	IN ELDS/OUT-OF-CELL	1				4
SILICA SOLUTION FEED TANK AGITATOR A	IN ELDS/OUT-OF-CELL	1				4
WASH SOLUTION FEED TANK	IN ELDS/OUT-OF-CELL	1	500 GAL	4' 6" DIA X 5' H	STAINLESS STEEL	15
WASH SOLUTION FEED TANK TRANSFER PUMP A	IN ELDS/OUT-OF-CELL	1				4
WASH SOLUTION FEED TANK AGITATOR A	IN ELDS/OUT-OF-CELL	1				4
WASH SOLUTION FEED TANK	IN ELDS/OUT-OF-CELL	1	500 GAL	4' 6" DIA X 5' H	STAINLESS STEEL	15
SCREEN MATERIAL TANK	IN ELDS/OUT-OF-CELL	1				4
SCREEN MATERIAL TANK TRANSFER PUMP A	IN ELDS/OUT-OF-CELL	1				4
SCREEN MATERIAL TANK AGITATOR A	IN ELDS/OUT-OF-CELL	1				4
PERMEATION MATERIAL TANK PUMP A	IN ELDS/OUT-OF-CELL	1				4
PERMEATION MATERIAL TANK AGITATOR A	IN ELDS/OUT-OF-CELL	1				4
WASTE ACID ADDITION TANK	IN ELDS/OUT-OF-CELL	1	500 GAL	4' 6" DIA X 5' H	STAINLESS STEEL	15
WASTE ACID ADDITION TANK TRANSFER PUMP A	IN ELDS/OUT-OF-CELL	1				4
WASTE ACID ADDITION TANK AGITATOR A	IN ELDS/OUT-OF-CELL	1				4
WASTE ACID ADDITION TANK	IN ELDS/OUT-OF-CELL	1	500 GAL	4' 6" DIA X 5' H	STAINLESS STEEL	15
NITRIC ACID ADDITION TANK	IN ELDS/OUT-OF-CELL	1				4
NITRIC ACID ADDITION TANK TRANSFER PUMP A	IN ELDS/OUT-OF-CELL	1				4
NITRIC ACID ADDITION TANK AGITATOR A	IN ELDS/OUT-OF-CELL	1				4
NITRIC ACID ADDITION TANK	IN ELDS/OUT-OF-CELL	1	500 GAL	4' 6" DIA X 5' H	STAINLESS STEEL	15
SODIUM HYDROXIDE ADDITION TANK - PUMP A	IN ELDS/OUT-OF-CELL	1				4
SODIUM HYDROXIDE ADDITION TANK	IN ELDS/OUT-OF-CELL	1				4
SODIUM HYDROXIDE ADDITION TANK - AGITATOR A	IN ELDS/OUT-OF-CELL	1				4
SODIUM HYDROXIDE ADDITION TANK	IN ELDS/OUT-OF-CELL	1	500 GAL	4' 6" DIA X 5' H	STAINLESS STEEL	15
SODIUM HYDROXIDE ADDITION TANK - TRANSFER PUMP A	IN ELDS/OUT-OF-CELL	1				4
SODIUM HYDROXIDE ADDITION TANK - AGITATOR A	IN ELDS/OUT-OF-CELL	1				4
SODIUM HYDROXIDE ADDITION TANK	IN ELDS/OUT-OF-CELL	1	500 GAL	4' 6" DIA X 5' H	STAINLESS STEEL	15

[illegible]

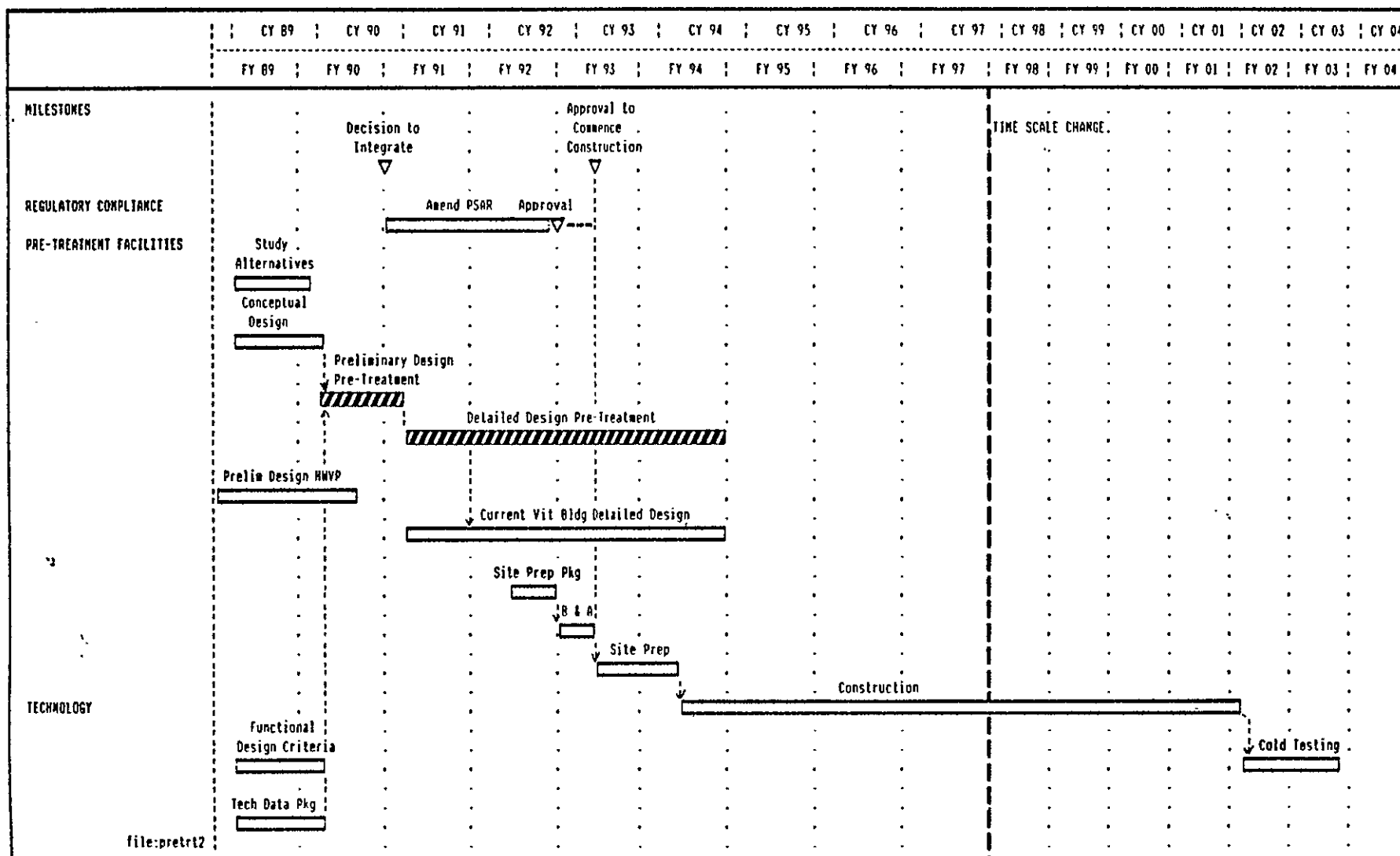
ITEM	LOCATION	QTY	CAPACITY	DIMENSION	MATERIAL	1953 \$
WATER TANK AGITATOR A	IN BLDG OUT-OF-CELL	1				4
ELUENT AGITATION TANK	IN BLDG OUT-OF-CELL	1	500 GAL	4' 6" DIA X 5' H	STAINLESS STEEL	18
ELUENT AGITATION TANK TRANSFER PUMP A	IN BLDG OUT-OF-CELL	1				4
ELUENT PUMP FOR TANK AGITATOR A	IN BLDG OUT-OF-CELL	1				4
TOTAL COLD CHEMICAL IN BLDG						
RECEIPT/STORAGE TANK	NOT IN BLDG OUT-OF-CELL	4	2000 GAL	15' 0" D X 15' 0"	STAINLESS STEEL	245
RECEIPT/STORAGE TANK TRANSFER PUMP A	NOT IN BLDG OUT-OF-CELL	2				20
RECEIPT/STORAGE TANK	NOT IN BLDG OUT-OF-CELL	3	20000 GAL	15' 0" D X 15' 0"	CARBON STEEL	120
RECEIPT/STORAGE TANK	NOT IN BLDG OUT-OF-CELL	3				15
RECEIPT/STORAGE TANK TRANSFER PUMP A	NOT IN BLDG OUT-OF-CELL	3	20000 GAL	15' 0" D X 15' 0"	ALUMINUM	345
RECEIPT/STORAGE TANK	NOT IN BLDG OUT-OF-CELL	12				42
RECEIPT/STORAGE TANK TRANSFER PUMP A	NOT IN BLDG OUT-OF-CELL	12				15
RECEIPT/STORAGE TANK	NOT IN BLDG OUT-OF-CELL	1	2000 GAL	7' 0" D X 7' 0"	STAINLESS STEEL	15
RECEIPT/STORAGE TANK	NOT IN BLDG OUT-OF-CELL	1				4
RECEIPT/STORAGE TANK	NOT IN BLDG OUT-OF-CELL	1	2000 GAL	7' 0" D X 7' 0"	STAINLESS STEEL	15
RECEIPT/STORAGE TANK	NOT IN BLDG OUT-OF-CELL	1				6
RECEIPT/STORAGE TANK TRANSFER PUMP A	NOT IN BLDG OUT-OF-CELL	1				7
RECEIPT/STORAGE TANK	NOT IN BLDG OUT-OF-CELL	1				7
RECEIPT/STORAGE TANK	NOT IN BLDG OUT-OF-CELL	1	2000 GAL	7' 0" D X 7' 0"	STAINLESS STEEL	18
RECEIPT/STORAGE TANK	NOT IN BLDG OUT-OF-CELL	1				4
RECEIPT/STORAGE TANK	NOT IN BLDG OUT-OF-CELL	1	2000 GAL	7' 0" D X 7' 0"	STAINLESS STEEL	15
RECEIPT/STORAGE TANK	NOT IN BLDG OUT-OF-CELL	1				6
RECEIPT/STORAGE TANK TRANSFER PUMP A	NOT IN BLDG OUT-OF-CELL	1				7
RECEIPT/STORAGE TANK	NOT IN BLDG OUT-OF-CELL	1	2000 GAL	7' 0" D X 7' 0"	STAINLESS STEEL	18
RECEIPT/STORAGE TANK	NOT IN BLDG OUT-OF-CELL	1				4
RECEIPT/STORAGE TANK	NOT IN BLDG OUT-OF-CELL	1	2000 GAL	7' 0" D X 7' 0"	STAINLESS STEEL	15
RECEIPT/STORAGE TANK	NOT IN BLDG OUT-OF-CELL	1				6
RECEIPT/STORAGE TANK TRANSFER PUMP A	NOT IN BLDG OUT-OF-CELL	1				7
RECEIPT/STORAGE TANK	NOT IN BLDG OUT-OF-CELL	1	2000 GAL	7' 0" D X 7' 0"	STAINLESS STEEL	18
RECEIPT/STORAGE TANK	NOT IN BLDG OUT-OF-CELL	1				4
RECEIPT/STORAGE TANK	NOT IN BLDG OUT-OF-CELL	1	2000 GAL	7' 0" D X 7' 0"	STAINLESS STEEL	15
RECEIPT/STORAGE TANK	NOT IN BLDG OUT-OF-CELL	1				6
RECEIPT/STORAGE TANK TRANSFER PUMP A	NOT IN BLDG OUT-OF-CELL	1				7
RECEIPT/STORAGE TANK	NOT IN BLDG OUT-OF-CELL	1	2000 GAL	7' 0" D X 7' 0"	STAINLESS STEEL	18
RECEIPT/STORAGE TANK	NOT IN BLDG OUT-OF-CELL	1				4
RECEIPT/STORAGE TANK	NOT IN BLDG OUT-OF-CELL	1	2000 GAL	7' 0" D X 7' 0"	STAINLESS STEEL	15
RECEIPT/STORAGE TANK	NOT IN BLDG OUT-OF-CELL	1				6
RECEIPT/STORAGE TANK TRANSFER PUMP A	NOT IN BLDG OUT-OF-CELL	1				7
RECEIPT/STORAGE TANK	NOT IN BLDG OUT-OF-CELL	1	2000 GAL	7' 0" D X 7' 0"	STAINLESS STEEL	18
RECEIPT/STORAGE TANK	NOT IN BLDG OUT-OF-CELL	1				4
RECEIPT/STORAGE TANK	NOT IN BLDG OUT-OF-CELL	1	2000 GAL	7' 0" D X 7' 0"	STAINLESS STEEL	15
RECEIPT/STORAGE TANK	NOT IN BLDG OUT-OF-CELL	1				6
RECEIPT/STORAGE TANK TRANSFER PUMP A	NOT IN BLDG OUT-OF-CELL	1				7
RECEIPT/STORAGE TANK	NOT IN BLDG OUT-OF-CELL	1	2000 GAL	7' 0" D X 7' 0"	STAINLESS STEEL	18
RECEIPT/STORAGE TANK	NOT IN BLDG OUT-OF-CELL	1				4
RECEIPT/STORAGE TANK	NOT IN BLDG OUT-OF-CELL	1	2000 GAL	7' 0" D X 7' 0"	STAINLESS STEEL	15
RECEIPT/STORAGE TANK	NOT IN BLDG OUT-OF-CELL	1				6
RECEIPT/STORAGE TANK TRANSFER PUMP A	NOT IN BLDG OUT-OF-CELL	1				7
RECEIPT/STORAGE TANK	NOT IN BLDG OUT-OF-CELL	1	2000 GAL	7' 0" D X 7' 0"	STAINLESS STEEL	18
RECEIPT/STORAGE TANK	NOT IN BLDG OUT-OF-CELL	1				4
RECEIPT/STORAGE TANK	NOT IN BLDG OUT-OF-CELL	1	2000 GAL	7' 0" D X 7' 0"	STAINLESS STEEL	15
RECEIPT/STORAGE TANK	NOT IN BLDG OUT-OF-CELL	1				6
RECEIPT/STORAGE TANK TRANSFER PUMP A	NOT IN BLDG OUT-OF-CELL	1				7
RECEIPT/STORAGE TANK	NOT IN BLDG OUT-OF-CELL	1	2000 GAL	7' 0" D X 7' 0"	STAINLESS STEEL	18
RECEIPT/STORAGE TANK	NOT IN BLDG OUT-OF-CELL	1				4
RECEIPT/STORAGE TANK	NOT IN BLDG OUT-OF-CELL	1				

ITEM	LOCATION	QTY	CAPACITY	DIMENSION	MATERIAL	1982 \$ 1980
PNEUMATIC TRANSFER SYSTEM	ANALYTICAL CELLS	4		2'	STAINLESS STEEL	1,435
TOTAL PNEUMATIC TRANSFER SYSTEM						
TRANSFER DEBRIDE	SAMPLE/ANALYST ROOM	4		2' x 2' x 2'	STAINLESS STEEL	625
SAMPLE MODULES	SAMPLE CELLS	36	15 ML		STAINLESS STEEL	2,505
TOTAL PROCESS SAMPLES						
HEAVY LBS EQUIPMENT	NO LBS	101			STAINLESS STEEL	1,613
COLD LBS EQUIPMENT	COLD LBS	10				102
TOTAL ANALYTICAL FACILITIES						
CEILING	CANTON OUT-OF-CELL	1	20 TON	78' x 11' x 20'	CARBON STEEL	735
50' SHIELD WINDOWS	MAIN, REMOTE CELLS	6			LEAD GLASS	765
25' SHIELD WINDOWS	SAMPLE REMOTE CELLS	10			LEAD GLASS	724
REMOTE LANE MANIPULATORS	VARIABLE REMOTE CELLS	32	MODEL F		STAINLESS STEEL	1,765
ELECT MECH MANIPULATORS	REMOTE MAIN CELLS	3	PAT 3000		STAINLESS STEEL	2,165
PSM CARTS	REM REMAIN	1	SINGLE		CARBON STEEL	72
SHIELD WINDOW UNIT	FRONT AREA	1			INP-20N STEEL	165
CEILING LIGHTS	CENT	1	7.5 TON		CARBON STEEL	1,218
CRANE BEAMS, VORTEX, & SPILLS	CANTON	101	30 TON		STAINLESS STEEL	267
OUT-OF ROOM EQUIPMENT	OUT-OF ROOM	101				1,132
FELP REMOTE LIGHTS	FELP	4			STAINLESS STEEL	31
TOTAL REMOTE HANDLING EQUIPMENT						
TOTAL GRAND, ALL EQUIPMENT						

TABLE 4-3. INTEGRATED FACILITY CONSTRUCTION COST ESTIMATE SUMMARY & BASIS

COST CATEGORIES	DIRECT COST X 1,000 (1988 \$)	ESTIMATE BASIS
Temporary Construction	\$1,000	Allowance of 30% of HWVP temporary construction
Site Prep	29	Material take off
Structures	\$54,269	Quantities based on drawing MTO Applied HWVP unit installation rates
Fire Protection/Detection	\$2,000	Same as stand-alone facility
HVAC	\$10,475	Vendor quotes for supply and exhaust fans and HEPA filter plenums Equipment factored ductwork and dampers/diffusers Cooling tower included with utilities Stack included with structure Increased size of sand filter(with structures)
In-Cell Pipe	\$18,447	Jumpers - MTO based on equipment count Embeds factored using HWVP data Hot pipe trench MTO
Electrical Supply	\$0	
Electrical Distribution	\$5,720	Same as stand-alone facility
Process Utilities	\$9,868	Capacity factored from HWVP
DCS SYSTEM	\$12,896	Equipment factored from PFM Installation factored from HWVP
HP System	\$7,596	Equipment factored estimate from HWVP
Communications	\$250	Same as stand-alone facility
Remote Handling, Sampling, Analytical & Maint Repair	\$20,414	Equipment factored estimate, see priced equipment list
Process Equipment:		
In-Cell Equipment	\$50,292	Same as stand-alone facility
Cold Chemical - In Bldg	\$4,123	Same as stand-alone facility
Cold Chemical - Out of Bldg	\$6,685	Same as stand-alone facility
Construction Startup	\$2,083	Factored from HWVP direct construction costs
Operations Control Building	\$1,796	Factored from HWVP
TOTAL DIRECT COST	\$207,943	

FIGURE 4-2
PRE-TREATMENT PLANT SCHEDULE
INTEGRATED (EXPANDED) VITRIFICATION BUILDING)



The co-located pre-treatment facility was estimated by combining HWVP with a co-located facility which would utilize existing HWVP services. The direct cost estimate for construction and procurement, including the estimate basis is shown in Table 4-4. Also included is a priced equipment list for the co-located pre-treatment alternative.

2) Co-Located Pre-Treatment Schedule

The schedule for the co-located pre-treatment facility is shown in Figure 4-3. The co-located pre-treatment schedule is very similar to the stand-alone pre-treatment schedule. Therefore, the critical activities flow through the Environmental Impact Statement and RCRA and the pre-treatment pilot plant demonstration for defining the technical data package.

Compared to the stand-alone and integrated pre-treatment alternatives the co-located schedule has a minor impact to the HWVP BA profile, because construction of the co-located facility does not occur until government fiscal year 1997.

ITEM	LOCATION	QTY	CAPACITY	DIMENSION	MATERIAL	1988 \$
DISSOLVER F	PROCESS CELL	1	42000 GAL	15" WIDE X 15.5" HIGH X 27' LONG	HASTELLOY C-276	2,135
DIRECTOR P TRANSFER PUMP A	PROCESS CELL	1			HASTELLOY C-276	245
DISSOLVER A TRANSFER PUMP F	PROCESS CELL	1			HASTELLOY C-276	245
DISSOLVER A AGITATOR A	PROCESS CELL	1			HASTELLOY C-276	506
DISSOLVER A AGITATOR F	PROCESS CELL	1			HASTELLOY C-276	506
DISSOLVER A SAMPLE PUMP A	PROCESS CELL	1			HASTELLOY C-276	201
DISSOLVER A CONDENSER DE-ENTRAINER	PROCESS CELL	1	10 GPM	NOZZLE 15" WIDE X 15" HIGH X 20' LONG	STAINLESS STEEL	216
SLUDGE RECEIVER A	PROCESS CELL	1	26000 GAL	15" WIDE X 15.5" HIGH X 20' LONG	SST 304L	522
TRANSFER PUMP A	PROCESS CELL	1			SST 304L	122
SLUDGE RECEIVER A	PROCESS CELL	1			SST 304L	186
SAMPLE PUMP A	PROCESS CELL	1			SST 304L	257
SLUDGE RECEIVER A AGITATOR A	PROCESS CELL	1			SST 304L	257
SLUDGE RECEIVER A AGITATOR B	PROCESS CELL	1			HASTELLOY C-276	2,135
TRANSFER PUMP A	PROCESS CELL	1	42000 GAL	15" WIDE X 15.5" HIGH X 27' LONG	HASTELLOY C-276	245
DISSOLVER B TRANSFER PUMP A	PROCESS CELL	1			HASTELLOY C-276	245
DISSOLVER B TRANSFER PUMP F	PROCESS CELL	1			HASTELLOY C-276	245
DISSOLVER B AGITATOR A	PROCESS CELL	1			HASTELLOY C-276	506
DISSOLVER B AGITATOR B	PROCESS CELL	1			HASTELLOY C-276	506
DISSOLVER B SAMPLE PUMP A	PROCESS CELL	1			HASTELLOY C-276	201
DISSOLVER B CONDENSER/DE-ENTRAINER	PROCESS CELL	1	10 GPM	NOZZLE 15" WIDE X 15" HIGH X 20' LONG	STAINLESS STEEL	216
SLUDGE RECEIVER B	PROCESS CELL	1	26000 GAL	15" WIDE X 15.5" HIGH X 20' LONG	SST 304L	622
TRANSFER PUMP A	PROCESS CELL	1			SST 304L	122
SLUDGE RECEIVER B AGITATOR A	PROCESS CELL	1			SST 304L	253
SLUDGE RECEIVER B AGITATOR B	PROCESS CELL	1			SST 304L	253
SLUDGE RECEIVER B SAMPLE PUMP A	PROCESS CELL	1			SST 304L	106

ITEM	LOCATION	QTY	CAPACITY	DIMENSION	MATERIAL	1982 \$ 1000
NO. 100000 (2 TONERS & 4 D) 20" H. W. RUBBLE (C/F TR-5)	PROCESS CELL	2		MODULE 15" WIDE X 15" HIGH X 20" LONG	STAINLESS STEEL	94
NO. 100000 TRANSFER PUMP A	PROCESS CELL	1				127
NO. 100000 PUMP B	PROCESS CELL	1				127
RECOVERER NITRIC TAN	PROCESS CELL	1	35000 GAL	15" WIDE X 15.5" HIGH X 22" LONG	STAINLESS STEEL	652
RECOVERER NITRIC TAN TRANSFER PUMP A	PROCESS CELL	1				127
RECOVERER NITRIC TAN AGITATOR A	PROCESS CELL	1				297
FEED END NITRIC TAN AGITATOR B	PROCESS CELL	1				297
RECOVERER FEED RECEIVER A	PROCESS CELL	1	28000 GAL	15" WIDE X 15.5" HIGH X 20" LONG	STAINLESS STEEL	622
SUPERPUMP FEED RECEIVER A TRANSFER PUMP A	PROCESS CELL	1				127
SUPERPUMP FEED/RECEIVER A AGITATOR A	PROCESS CELL	1				297
SUPERPUMP FEED/RECEIVER A AGITATOR B	PROCESS CELL	1				297
SUPERPUMP FEED/RECEIVER B	PROCESS CELL	1	28000 GAL	15" WIDE X 15.5" HIGH X 20" LONG	STAINLESS STEEL	622
SUPERPUMP FEED/RECEIVER B TRANSFER PUMP A	PROCESS CELL	1				127
SUPERPUMP FEED/RECEIVER B AGITATOR A	PROCESS CELL	1				297
SUPERPUMP FEED/RECEIVER B AGITATOR B	PROCESS CELL	1				297
LOW LEVEL WASTE TAN A	PROCESS CELL	1	40000 GAL	15" WIDE X 15.5" HIGH X 27" LONG	STAINLESS STEEL	736
LOW LEVEL WASTE TAN A TRANSFER PUMP A	PROCESS CELL	1				127
LOW LEVEL WASTE TAN A AGITATOR A	PROCESS CELL	1				297
LOW LEVEL WASTE TAN A AGITATOR B	PROCESS CELL	1				297
LOW LEVEL WASTE TAN B	PROCESS CELL	1	40000 GAL	15" WIDE X 15.5" HIGH X 27" LONG	STAINLESS STEEL	736
LOW LEVEL WASTE TAN B TRANSFER PUMP A	PROCESS CELL	1				127
LOW LEVEL WASTE TAN B AGITATOR A	PROCESS CELL	1				297
LOW LEVEL WASTE TAN B AGITATOR B	PROCESS CELL	1				297

ITEM	LOCATION	QTY	CAPACITY	DIMENSION	MATERIAL	1985 \$
C5 PRODUCT STORAGE	PROCESS CELL	1	5000 GAL		STAINLESS STEEL	356
C6 PRODUCT STORAGE TRANSFER PUMP A	PROCESS CELL	1				123
C5 PRODUCT STORAGE AGITATOR A	PROCESS CELL	1				287
C5 PROD RECEIVER	PROCESS CELL		1000 GAL		STAINLESS STEEL	232
C5 PROD RECVR COOLING COIL	PROCESS CELL	1				66
C6 PROD RECEIVER TRANSFER PUMP A	PROCESS CELL	1				127
C6 PROD RECEIVER AGITATOR A	PROCESS CELL	1				280
C6 PROD RECEIVER	PROCESS CELL	1	14000 GAL	13.5 DIA X 13.5' HIGH	STAINLESS STEEL	591
C6 PROD RECEIVER COOLING COIL						66
C7 FEED RECEIVER TRANSFER PUMP A	PROCESS CELL	1				103
C7 ELUANT RECICLE	PROCESS CELL	1	14000 GAL	13.5 DIA X 13.5' HIGH	STAINLESS STEEL	591
C7 ELUANT RECICLE COOLING COIL						66
C7 ELUANT RECICLE TRANSFER PUMP A	PROCESS CELL	1				107
C7 ELUANT RECICLE AGITATOR A	PROCESS CELL	1				232
C7 PUMP TANK	PROCESS CELL	1	10000 GAL		STAINLESS STEEL	66
C7 PUMP TANK COOLING COIL						123
C7 PUMP TANK TRANSFER PUMP A	PROCESS CELL	1				252
C7 PUMP TANK AGITATOR A	PROCESS CELL	1				252
C7 WASTE RECEIVER	PROCESS CELL		2000 GAL		STAINLESS STEEL	232
C7 WASTE RECEIVER COOLING COIL						66
C7 WASTE RECEIVER TRANSFER PUMP A	PROCESS CELL	1				103
C7 WASTE RECEIVER AGITATOR A	PROCESS CELL	1				257
C7 FEED STORAGE	PROCESS CELL	1	14000 GAL	13.5 DIA X 13.5' HIGH	STAINLESS STEEL	591
C7 FEED STORAGE COOLING COIL						66
C7 FEED STORAGE TRANSFER PUMP A	PROCESS CELL	1				123
C7 FEED STORAGE AGITATOR A	PROCESS CELL	1				232
C7 PUMP COLLECTION TANK	PROCESS CELL	1	5000 GAL	10 DIA X 10' HIGH	STAINLESS STEEL	356
C7 PUMP COLLECTION TANK COOLING COIL						66
C7 PUMP COLLECTION TANK TRANSFER PUMP A	PROCESS CELL	1				107

ITEM	LOCATION	QTY	CAPACITY	DIMENSION	MATERIAL	1988 \$ \$ x 1000
SUMP COLLECTION TANK AGITATOR A	PROCESS CELL	1				253
WASTE OFFGAS SCRUBBER RECEIVER TANK TRANSFER PUMP A	PROCESS CELL	1	4000 GAL	10' D X 7' H	STAINLESS STEEL	346 68
WASTE OFFGAS SCRUBBER RECEIVER TANK AGITATOR A	PROCESS CELL	1				123
WASTE OFFGAS SCRUBBER RECEIVER TANK AGITATOR A	PROCESS CELL	1	8000 GAL	10' DIA X 14' HIGH	STAINLESS STEEL	525 68
FEED WASTE UP TANK COOLING COIL	PROCESS CELL	1				123
FEED WASTE UP TANK TRANSFER PUMP A	PROCESS CELL	1				123
FEED WASTE UP TANK AGITATOR A	PROCESS CELL	1				253
FEED WASTE UP TANK AGITATOR A	PROCESS CELL	1				253
FEED PUMP TANK COOLING COIL	PROCESS CELL	1	8000 GAL	10' DIA X 14' HIGH	STAINLESS STEEL	525 68
FEED PUMP TANK FEED PUMP A	PROCESS CELL	1				123
FEED PUMP TANK AGITATOR A	PROCESS CELL	1				253
WASTE RECEIVER TANK COOLING COIL	PROCESS CELL	1	8000 GAL	10' DIA X 14' HIGH	STAINLESS STEEL	525 68
WASTE RECEIVER TANK COOLING COIL	PROCESS CELL	1				123
WASTE RECEIVER TANK TRANSFER PUMP A	PROCESS CELL	1				123
WASTE RECEIVER TANK AGITATOR A	PROCESS CELL	1				253
SOLVENT FEED TANK COOLING COIL	PROCESS CELL	1	4000 GAL	8' DIA X 10' HIGH	STAINLESS STEEL	346 68
SOLVENT FEED TANK COOLING COIL	PROCESS CELL	1				123
SOLVENT FEED TANK FEED PUMP A	PROCESS CELL	1				123
SOLVENT FEED TANK AGITATOR A	PROCESS CELL	1				253
SOLVENT WASH WASTE TANK COOLING COIL	PROCESS CELL	1	4000 GAL	8' DIA X 10' HIGH	STAINLESS STEEL	346 68
SOLVENT WASH WASTE TANK COOLING COIL	PROCESS CELL	1				123
SOLVENT WASH WASTE TANK FEED PUMP A	PROCESS CELL	1				123
SOLVENT WASH WASTE TANK AGITATOR A	PROCESS CELL	1				253
SOLVENT STORAGE TANK COOLING COIL	PROCESS CELL	1	4000 GAL	8' DIA X 10' HIGH	STAINLESS STEEL	346 68
SOLVENT STORAGE TANK COOLING COIL	PROCESS CELL	1				123
SOLVENT STORAGE TANK TRANSFER PUMP A	PROCESS CELL	1				123
SOLVENT STORAGE TANK AGITATOR A	PROCESS CELL	1				253

ITEM	LOCATION	QTY	CAPACITY	DIMENSION	MATERIAL	1988 \$ \$ x 1000
TRU PRODUCT RECEIVER	PROCESS CELL	1	1400 GAL	6'DIA X 9' HIGH	STAINLESS STEEL	283
TRU PRODUCT RECVR COOLING COIL						68
TRU PRODUCT RECEIVER TRANSFER PUMP A	PROCESS CELL	1				123
TRU CONCENTRATOR & STRIPPER (K PACED COL.)	PROCESS CELL	1	1400 GAL	6'DIA X 9' HIGH 1'DIA X 6' HIGH	HPS/STELLIT	316
TRU CONCENTRATOR CONDENSER	PROCESS CELL	1		17'D X 5' LONG	STAINLESS STEEL	316
CONCENTRATED TRU RECEIVER A	PROCESS CELL	1	6000 GAL	10'DIA XII HIGH	STAINLESS STEEL	442
CONCENTRD TRU RCVR A COOLING COIL						68
CONCENTRATED TRU RECEIVER A TRANSFER PUMP A	PROCESS CELL	1				123
CONCENTRATED TRU RECEIVER A AGITATOR A	PROCESS CELL	1				253
CONCENTRATED TRU RECEIVER B	PROCESS CELL	1	6000 GAL	10'DIA XII HIGH	STAINLESS STEEL	442
CONCENTRD TRU RCVR B COOLING COIL						68
CONCENTRATED TRU RECEIVER B TRANSFER PUMP A	PROCESS CELL	1				123
CONCENTRATED TRU RECEIVER B AGITATOR A	PROCESS CELL	1				253
TRU CONDENSATE RECEIVER	PROCESS CELL	1	3000 GAL	8'DIA X 10' HIGH	STAINLESS STEEL	303
TRU CONDENSATE RECVR COOLING COIL						68
TRU CONDENSATE RECEIVER TRANSFER PUMP A	PROCESS CELL	1				123
TRU CONDENSATE RECEIVER AGITATOR A	PROCESS CELL	1				253
REGENERATION WASTE TANK	PROCESS CELL	1	1000 GAL	4'DIA X 10' HIGH	STAINLESS STEEL	232
REGENERATION WASTE TANK COOLING COIL						68
PMP FILTER A	PROCESS CELL	1	20 GPM	27'D X 8' LONG	STAINLESS STEEL	316
PMP FILTER B	PROCESS CELL	1	20 GPM	27'D X 8' LONG	STAINLESS STEEL	316
PRECOAT FEED TANK	PROCESS CELL	1	1000 GAL	4'D X 10'H	STAINLESS STEEL	232
PRECOAT FEED TANK COOLING COIL						68
PRECOAT FEED TANK TRANSFER PUMP A	PROCESS CELL	1				123
PRECOAT FEED TANK AGITATOR A	PROCESS CELL	1				253
NH3 SCRUBBER CONCENTRATOR RECVR	PROCESS CELL	1	1000 GAL	5'D X 7'H	STAINLESS STEEL	232
NH3 SCRUBR CONCR RCVR COOL COIL						68
NH3 SCRUBBER CONCENTRATOR RECVR TRANSFER PUMP A	PROCESS CELL	1				123
NH3 SCRUBBER CONCENTRATOR RECVR AGITATOR A	PROCESS CELL	1				253

ITEM	LOCATION	QTY	CAPACITY	DIMENSION	MATERIAL	1988 \$ x 1000
NH3 SCRUBBER CONDENSATE RECVR	PROCESS CELL	1	4000 GAL	10' D X 7' H	STAINLESS STEEL	346
NH3 SCRUB CONDST REC COOL COIL						68
NH3 SCRUBBER CONDENSATE RECVR TRANSFER PUMP A	PROCESS CELL	1				123
NH3 SCRUBBER CONDENSATE RECVR AGITATOR A	PROCESS CELL	1				253
TRUEX EXTRACTION MODULE EXTRACTIN CENTRIFUGAL CONTACTORS	PROCESS CELL	1		MODULE 4' W X 12' L X 8' H	STAINLESS STEEL	194
TRUEX SOLVEX MODULE SCRUB CENTRIFUGAL CONTACTORS	PROCESS CELL	1		MODULE 4' W X 8' L X 8' H	STAINLESS STEEL	139
TRUEX STRIPPER MODULE STRIP CENTRIFUGAL CONTACTORS	PROCESS CELL	1		MODULE 4' W X 10' L X 8' H	STAINLESS STEEL	166
TRUEX SOLVENT WASH MODULE WASH CENTRIFUGAL CONTACTORS	PROCESS CELL	1		MODULE 2' W X 10' L X 8' H	STAINLESS STEEL	111
IX SOLVENT COLUMN	PROCESS CELL	1		1' D X 6' H	STAINLESS STEEL	6
IX COLUMN	PROCESS CELL	1	3000 GAL	6' D X 15' H	STAINLESS STEEL	107
Cs CONCENTRATOR	PROCESS CELL	1	10 BPH	15' H	STAINLESS STEEL	362
Cs CONCENTRATOR CONDENSER	PROCESS CELL	1		2' D X 6' L	STAINLESS STEEL	316
NH3 SCRUBBER SOLUTION CONCENTRATOR	PROCESS CELL	1	20 BPH	15' H	STAINLESS STEEL	514
NH3 OFF-GAS SCRUBBER W/BUBBLE CAP TRAYS	PROCESS CELL	1		6' D X 12' H	STAINLESS STEEL	107
NH3 SCRUBBER CONCENTRATOR CONDENSER	PROCESS CELL	1	20 BPH	3' D X 7' H	STAINLESS STEEL	316
OFF-GAS HEATER	PROCESS CELL	1	1500 SCFH		STAINLESS STEEL	16
OFF-GAS FILTER	PROCESS CELL	1	1500 SCFH		STAINLESS STEEL	250
TANK JETS	PROCESS CELL	30			STAINLESS STEEL	15
SUMP JETS	PROCESS CELL	6	25 BPH		STAINLESS STEEL	7
TOTAL IN-CELL EQUIPMENT						39,725
SCRUB SOLUTION FEED TANK	IN BLDG/OUT-OF-CELL	1	500 GAL	4' 6" DIA X 5' H	STAINLESS STEEL	18
SCRUB SOLUTION FEED TANK TRANSFER PUMP A	IN BLDG/OUT-OF-CELL	1				4
SCRUB SOLUTION FEED TANK AGITATOR A	IN BLDG/OUT-OF-CELL	1				4
STRIP SOLUTION FEED TANK	IN BLDG/OUT-OF-CELL	1	500 GAL	4' 6" DIA X 5' H	STAINLESS STEEL	18

ITEM	LOCATION	QTY	CAPACITY	DIMENSION	MATERIAL	1988 \$ x 1000
STEPLE SOLUTION FEED TANK TRANSFER PUMP A	IN BLDG/OUT-OF-CELL	1				4
STEPLE SOLUTION FEED TANK AGITATOR A	IN BLDG/OUT-OF-CELL	1				4
WASH SOLUTION FEED TANK	IN BLDG/OUT-OF-CELL	1	500 GAL	4'6" DIA X 5' H	STAINLESS STEEL	18
WASH SOLUTION FEED TANK TRANSFER PUMP A	IN BLDG/OUT-OF-CELL	1				4
WASH SOLUTION FEED TANK AGITATOR A	IN BLDG/OUT-OF-CELL	1				4
SOLVENT MAKEUP TANK	IN BLDG/OUT-OF-CELL	1	500 GAL	4'6" DIA X 5' H	STAINLESS STEEL	18
SOLVENT MAKEUP TANK TRANSFER PUMP A	IN BLDG/OUT-OF-CELL	1				4
SOLVENT MAKEUP TANK AGITATOR A	IN BLDG/OUT-OF-CELL	1				4
REGENERATION MAKEUP TANK	IN BLDG/OUT-OF-CELL	1	500 GAL	4'6" DIA X 5' H	STAINLESS STEEL	18
REGENERATION MAKEUP TANK PUMP A	IN BLDG/OUT-OF-CELL	1				4
REGENERATION MAKEUP TANK AGITATOR A	IN BLDG/OUT-OF-CELL	1				4
0.1M NITRIC ACID ADDITION TANK	IN BLDG/OUT-OF-CELL	1	500 GAL	4'6" DIA X 5' H	STAINLESS STEEL	18
0.1M NITRIC ACID ADDITION TANK TRANSFER PUMP A	IN BLDG/OUT-OF-CELL	1				4
0.1M NITRIC ACID ADDITION TANK AGITATOR A	IN BLDG/OUT-OF-CELL	1				4
0.5M NITRIC ACID ADDITION TANK	IN BLDG/OUT-OF-CELL	1	500 GAL	4'6" DIA X 5' H	STAINLESS STEEL	18
0.5M NITRIC ACID ADDITION TANK TRANSFER PUMP A	IN BLDG/OUT-OF-CELL	1				4
0.5M NITRIC ACID ADDITION TANK AGITATOR A	IN BLDG/OUT-OF-CELL	1				4
0.5M SODIUM HYDROXIDE ADDITION TANK	IN BLDG/OUT-OF-CELL	1	500 GAL	4'6" DIA X 5' H	STAINLESS STEEL	18
0.5M SODIUM HYDROXIDE ADDITION TANK - PUMP A	IN BLDG/OUT-OF-CELL	1				4
0.5M SODIUM HYDROXIDE ADDITION TANK - AGITATOR A	IN BLDG/OUT-OF-CELL	1				4
0.5M SODIUM HYDROXIDE ADDITION TANK	IN BLDG/OUT-OF-CELL	1	500 GAL	4'6" DIA X 5' H	STAINLESS STEEL	18
0.5M SODIUM HYDROXIDE ADDITION TANK - TRANSFER PUMP A	IN BLDG/OUT-OF-CELL	1				4
0.5M SODIUM HYDROXIDE ADDITION TANK - AGITATOR A	IN BLDG/OUT-OF-CELL	1				4
PRE-COAT FEED TANK	IN BLDG/OUT-OF-CELL	1	500 GAL	4'6" DIA X 5' H	STAINLESS STEEL	18

ITEM	LOCATION	QTY	CAPACITY	DIMENSION	MATERIAL	1988 \$ \$ 1000
PRE-COOL FEED TANK TRANSFER PUMP A	IN BLDG/OUT-OF-CELL	1				4
PRE-COOL FEED TANK AGITATOR A	IN BLDG/OUT-OF-CELL	1				4
12M NITRIC ACID ADDITION TANK	IN BLDG/OUT-OF-CELL	1	500 GAL	4'6" DIA X 5' H	STAINLESS STEEL	18
12M NITRIC ACID ADDITION TANK TRANSFER PUMP A	IN BLDG/OUT-OF-CELL	1				4
12M NITRIC ACID ADDITION TANK AGITATOR A	IN BLDG/OUT-OF-CELL	1				4
PEROXIDE FEED TANK	IN BLDG/OUT-OF-CELL	1	500 GAL	4'6" DIA X 5' H	STAINLESS STEEL	18
PEROXIDE FEED TANK TRANSFER PUMP A	IN BLDG/OUT-OF-CELL	1				4
PEROXIDE FEED TANK AGITATOR A	IN BLDG/OUT-OF-CELL	1				4
SLUDGE RECEIVER SODIUM NITRITE ADDITION TANK	IN BLDG/OUT-OF-CELL	1	500 GAL	4'6" DIA X 5' H	STAINLESS STEEL	18
SLUDGE RECEIVER SODIUM NITRITE ADDITION TANK-PUMP A	IN BLDG/OUT-OF-CELL	1				4
SLUDGE RECEIVER SODIUM NITRITE ADDITION TANK-PUMP A	IN BLDG/OUT-OF-CELL	1				4
SLUDGE RECEIVER SODIUM NITRITE ADDITION TANK-AGITATOR A	IN BLDG/OUT-OF-CELL	1				4
LOW LEVEL WASTE TANK SODIUM NITRITE ADDITION TANK	IN BLDG/OUT-OF-CELL	1	500 GAL	4'6" DIA X 5' H	STAINLESS STEEL	18
LOW LEVEL WASTE TANK SODIUM NITRITE ADDITION TANK-PUMP A	IN BLDG/OUT-OF-CELL	1				4
LOW LEVEL WASTE TANK SODIUM NITRITE ADDITION TANK-AGITATOR A	IN BLDG/OUT-OF-CELL	1				4
1X MAKEUP TANK (CS)	IN BLDG/OUT-OF-CELL	1	500 GAL	4'6" DIA X 5' H	STAINLESS STEEL	18
1X MAKEUP TANK (CS) TRANSFER PUMP A	IN BLDG/OUT-OF-CELL	1				4
1X MAKEUP TANK (CS) AGITATOR A	IN BLDG/OUT-OF-CELL	1				4
OFF-GAS TREATMENT SODIUM NITRITE TANK	IN BLDG/OUT-OF-CELL	1	500 GAL	4'6" DIA X 5' H	STAINLESS STEEL	18
OFF-GAS TREATMENT SODIUM NITRITE TANK - PUMP A	IN BLDG/OUT-OF-CELL	1				4
OFF-GAS TREATMENT SODIUM NITRITE TANK - AGITATOR A	IN BLDG/OUT-OF-CELL	1				4
UTILITY TANK	IN BLDG/OUT-OF-CELL	1	500 GAL	4'6" DIA X 5' H	STAINLESS STEEL	18
UTILITY TANK TRANSFER PUMP A	IN BLDG/OUT-OF-CELL	1				4
UTILITY TANK AGITATOR A	IN BLDG/OUT-OF-CELL	1				4
1X MAKEUP TANK	IN BLDG/OUT-OF-CELL	1	500 GAL	4'6" DIA X 5' H	STAINLESS STEEL	18
1X MAKEUP TANK TRANSFER PUMP A	IN BLDG/OUT-OF-CELL	1				4

ITEM	LOCATION	QTY	CAPACITY	DIMENSION	MATERIAL	1988 \$ \$ x 1000
17 WASTE TANK AGITATOR A	IN BLDG/OUT-OF-CELL	1				4
ELEMENT ADDITION TANK	IN BLDG/OUT-OF-CELL	1	500 GAL	4'6" DIA X 5' H	STAINLESS STEEL	18
ELEMENT ADDITION TANK TRANSFER PUMP A	IN BLDG/OUT-OF-CELL	1				4
ELEMENT ADDITION TANK AGITATOR A	IN BLDG/OUT-OF-CELL	1				4
TOTAL COLD CHEMICAL IN BLDG						494
NITRIC ACID STORAGE TANK	NOT IN BLDG/ OUT-OF-CELL	4	20000 GAL	15'0"D X 15'6" HIGH	STAINLESS STEEL	345
NITRIC ACID STORAGE TANK TRANSFER PUMP A	NOT IN BLDG/ OUT-OF-CELL	4				21
SODIUM HYDROXIDE STORAGE TANK	NOT IN BLDG/ OUT-OF-CELL	3	20000 GAL	15'0"D X 15'6" HIGH	CARBON STEEL	121
SODIUM HYDROXIDE STEG TANK TRANSFER PUMP A	NOT IN BLDG/ OUT-OF-CELL	3				15
HYDROGEN PEROXIDE STORAGE T	NOT IN BLDG/ OUT-OF-CELL	12	20000 GAL	9'0"D X 40' LONG	ALUMINUM	349
HYDROGEN PEROXIDE STORAGE T TRANSFER PUMP A	NOT IN BLDG/ OUT-OF-CELL	12				62
SECURE SOLUTION MIX TANK	NOT IN BLDG/ OUT-OF-CELL	1	2000 GAL	7'0"D X 7'0" HIGH	STAINLESS STEEL	18
SECURE SOLUTION MIX TANK TRANSFER PUMP A	NOT IN BLDG/ OUT-OF-CELL	1				6
SECURE SOLUTION MIX TANK AGITATOR A	NOT IN BLDG/ OUT-OF-CELL	1				7
STRIP SOLUTION MIX TANK	NOT IN BLDG/ OUT-OF-CELL	1	2000 GAL	7'0"D X 7'0" HIGH	STAINLESS STEEL	18
STRIP SOLUTION MIX TANK TRANSFER PUMP A	NOT IN BLDG/ OUT-OF-CELL	1				6
STRIP SOLUTION MIX TANK AGITATOR A	NOT IN BLDG/ OUT-OF-CELL	1				7
WASH SOLUTION MIX TANK	NOT IN BLDG/ OUT-OF-CELL	1	2000 GAL	7'0"D X 7'0" HIGH	STAINLESS STEEL	18
WASH SOLUTION MIX TANK TRANSFER PUMP A	NOT IN BLDG/ OUT-OF-CELL	1				6
WASH SOLUTION MIX TANK AGITATOR A	NOT IN BLDG/ OUT-OF-CELL	1				7
WPH RECEIPT/STORAGE TANK	NOT IN BLDG/ OUT-OF-CELL	1	2000 GAL	7'0"D X 7'0" HIGH	STAINLESS STEEL	18
WPH RECEIPT/STORAGE TANK TRANSFER PUMP A	NOT IN BLDG/ OUT-OF-CELL	1				6
WPH RECEIPT/STORAGE TANK	NOT IN BLDG/ OUT-OF-CELL	1	2000 GAL	7'0"D X 7'0" HIGH	STAINLESS STEEL	18
WPH RECEIPT/STORAGE TANK TRANSFER PUMP P	NOT IN BLDG/ OUT-OF-CELL	1				6

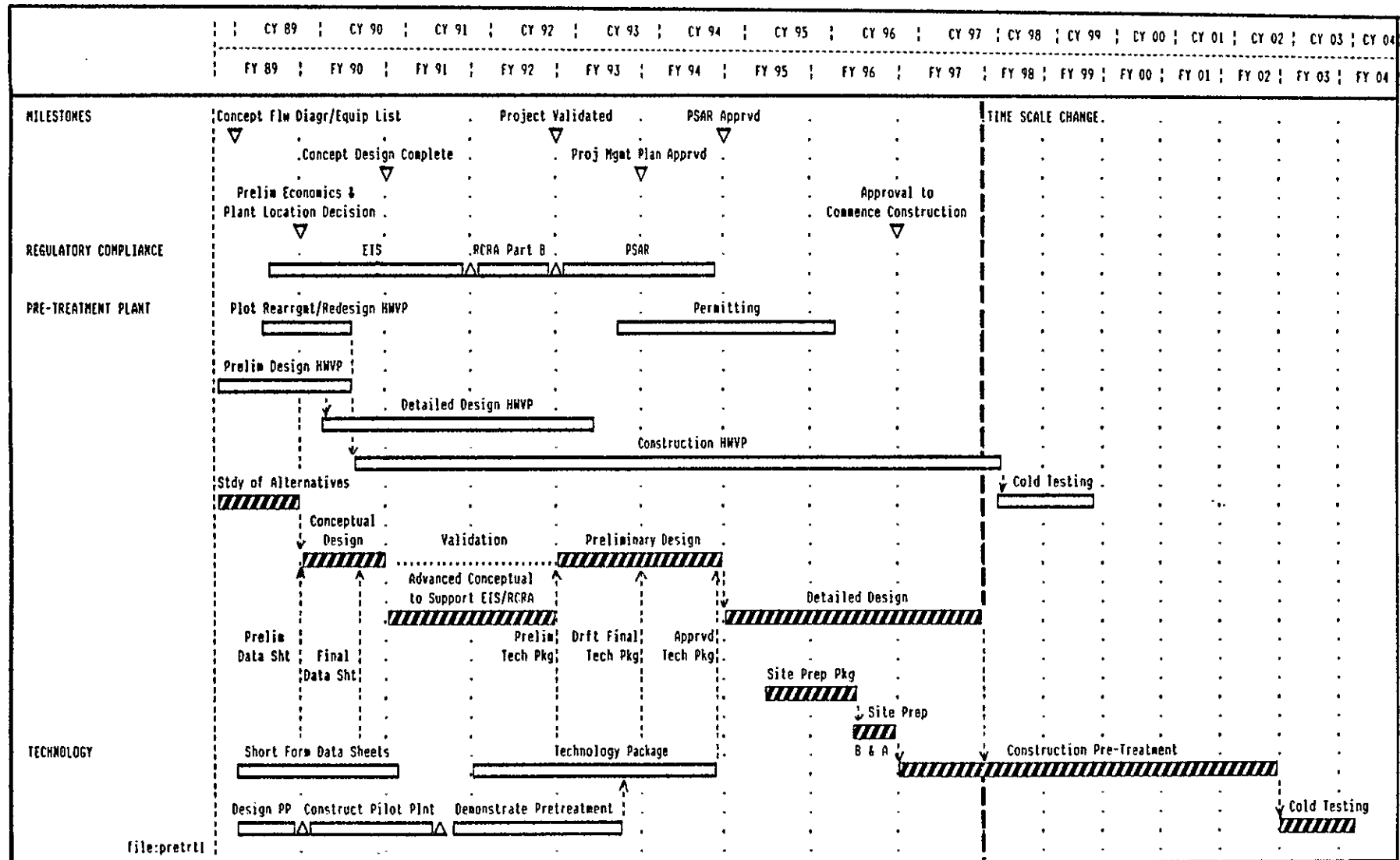
ITEM	LOCATION	QTY	CAPACITY	DIMENSION	MATERIAL	1986 \$ x 1000
CHEM MIX TANK TRANSFER PUMP A	NOT IN BLDG/ OUT-OF-CELL	1	500 GAL	4'6" D X 5'0" HIGH	STAINLESS STEEL	18
CHEM MIX TANK AGITATOR A	NOT IN BLDG/ OUT-OF-CELL	1				4
SOLVENT MIX TANK	NOT IN BLDG/ OUT-OF-CELL	1	500 GAL	4'6" D X 5'0" HIGH	STAINLESS STEEL	18
SOLVENT MIX TANK TRANSFER PUMP A	NOT IN BLDG/ OUT-OF-CELL	1				4
SOLVENT MIX TANK AGITATOR A	NOT IN BLDG/ OUT-OF-CELL	1				4
NITRIC ACID DILUTION TANK	NOT IN BLDG/ OUT-OF-CELL	3	500 GAL	4'6" D X 5'0" HIGH	STAINLESS STEEL	18
NITRIC ACID DILUTION TANK TRANSFER PUMP A	NOT IN BLDG/ OUT-OF-CELL	3				4
NITRIC ACID DILUTION TANK AGITATOR A	NOT IN BLDG/ OUT-OF-CELL	3				4
SODIUM HYDROXIDE DILUTION TANK	NOT IN BLDG/ OUT-OF-CELL	2	500 GAL	4'6" D X 5'0" HIGH	STAINLESS STEEL	18
SODIUM HYDROXIDE DILUTION TANK TRANSFER PUMP A	NOT IN BLDG/ OUT-OF-CELL	2				4
SODIUM HYDROXIDE DILUTION TANK AGITATOR A	NOT IN BLDG/ OUT-OF-CELL	2				4
SODIUM NITRITE MIX TANK	NOT IN BLDG/ OUT-OF-CELL	1	500 GAL	4'6" D X 5'0" HIGH	STAINLESS STEEL	18
SODIUM NITRITE MIX TANK TRANSFER PUMP A	NOT IN BLDG/ OUT-OF-CELL	1				4
SODIUM NITRITE MIX TANK AGITATOR A	NOT IN BLDG/ OUT-OF-CELL	1				4
PRECODT MIX TANK	NOT IN BLDG/ OUT-OF-CELL	1	500 GAL	4'6" D X 5'0" HIGH	STAINLESS STEEL	18
PRECODT MIX TANK TRANSFER PUMP A	NOT IN BLDG/ OUT-OF-CELL	1				4
PRECODT MIX TANK AGITATOR A	NOT IN BLDG/ OUT-OF-CELL	1				4
TOTAL COLD CHEMICAL OUT OF BLDG						1,210
REG MAINTENANCE EQUIPMENT	REG MAINT SHOP	LOT				568
NON-REG MAINTENANCE EQUIPMENT	NON-REG SHOP	LOT				178
MSR REPAIR EQUIPMENT	MSR REPAIR	LOT				164
TOTAL REGULATED, NON-REGULATED & MSR REPAIR						910

ITEM	LOCATION	QTY	CAPACITY	DIMENSION	MATERIAL	1982 \$ x 1000	
PNEUMATIC TRANSFER SYSTEM	ANALYTICAL CELLS	4		2"	STAINLESS STEEL	1,648	
DECON BLOW BOX	MSM REPAIR	1			STAINLESS STEEL	76	
CHS. DECON EQUIPMENT		LOT				55	
TOTAL EQUIPMENT DECON REPAIR & MAINTENANCE							1,779
TRANSFER DRAINERS	SAMPLE/ANALYT ROOM	4		2' X 2' X 2'	STAINLESS STEEL	688	
SAMPLE MODULES	SAMPLE CELLS	35	15 ML		STAINLESS STEEL	2,205	
TOTAL PROCESS SAMPLING							2,893
HOT LAB EQUIPMENT	HOT LAB	LOT			STAINLESS STEEL	1,808	
COLD LAB EQUIPMENT	COLD LAB	LOT				103	
TOTAL ANALYTICAL FACILITIES							1,911
CRANE	CANYON/DUT-OF-CELL	1	30 TON	75' X 11' X 20'	CARBON STEEL	785	
60" SHIELD WINDOWS	MAINT. REMOTE CELLS	6			LEAD GLASS	789	
25" SHIELD WINDOWS	SAMPLE REMOTE CELLS	10			LEAD GLASS	774	
MASTER SLAVE MANIPULATIONS	VARIOUS REMOTE CELLS	32	MODEL F		STAINLESS STEEL	1,768	
ELECT MECH MANIPULATORS	REMOTE MAIN CELLS	3	PAR 3000		STAINLESS STEEL	2,165	
MSM CARTS	MSM REPAIR	3	SINGLE		CARBON STEEL	73	
SHIELD WINDOW CART	MAINT AREA	1			CARBON STEEL	166	
CDMC CRANE	CDMC	1	7.5 TON		CARBON STEEL	1,218	
CHS SHIELD DOOR/HOIST	CHS				STAINLESS STEEL	683	
CRANE BLOODS, VORES, & BAILS	CANYON	LOT	30 TON		STAINLESS STEEL	263	
CUT-UP ROOM EQUIPMENT	CUT-UP ROOM	LOT				1,122	
FEDA REMOTE LIGHTS	FEDA	4			STAINLESS STEEL	31	
TOTAL REMOTE HANDLING EQUIPMENT							9,837
TOTAL GRAND, ALL EQUIPMENT							58,759

TABLE 4-4. CO-LOCATED FACILITY CONSTRUCTION COST ESTIMATE SUMMARY & BASIS

COST CATEGORIES	DIRECT COST X 1,000 (1988 \$)	ESTIMATE BASIS
Temporary Construction	\$1,000	Allowance of 30% of HWVP temporary construction
Site Prep	79	Material take off
Structures	\$59,645	Quantities based on drawing MTO Applied HWVP unit installation rates
Fire Protection/Detection	\$2,000	Same as stand-alone facility
HVAC	\$11,868	Used stand-alone supply/exhaust system Equipment factored ductwork and dampers/diffusers Cooling tower included with utilities Stack included with structure Increased size of sand filter(with structures)
In-Cell Pipe	\$14,828	Same as stand-alone facility
Electrical Supply	\$184	Capacity factored from HWVP
Electrical Distribution	\$5,720	Same as stand-alone facility
Process Utilities	\$13,351	Capacity factored from HWVP
DCS System	\$12,896	Equipment factored from PFM Installation factored from HWVP
HP System	\$9,148	Equipment factored estimate from HWVP
Communications	\$250	Same as stand-alone facility
Remote Handling, Sampling, Analytical & Maint Repair	\$21,352	Same as stand-alone facility
Process Equipment:		
In-Cell Equipment	\$50,292	Same as stand-alone facility
Cold Chemical - In Bldg	\$4,123	Same as stand-alone facility
Cold Chemical - Out of Bldg	\$6,685	Same as stand-alone facility
Construction Startup	\$2,160	Factored from HWVP direct construction costs
Operations Control Building	\$0	
TOTAL DIRECT COST	\$215,641	

FIGURE 4-3
PRE-TREATMENT PLANT SCHEDULE
CO-LOCATED





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4.5.2 Co-Located Pre-treatment Schedule

The schedule for the co-located pre-treatment facility is shown in Figure 4-3. The co-located pre-treatment schedule is similar to the stand-alone pre-treatment schedule. Therefore, the critical activities flow through the Environmental Impact Statement and RCRA and the pre-treatment pilot plant demonstration for defining the technical data package.

The budget authorization (BA) profile for the Co-located pre-treatment facility is similar to the stand-alone pre-treatment BA profile.

4.6 Contingency Analysis

The contingency analysis for construction costs was based on an assessment of the estimating information and completeness of data for each system. The contingency for Detailed Design, Field Engineering and Inspection, Engineering Management, Construction Management, and Project Management was assumed to be 30% for this estimate.

5.0 Life Cycle Cost Estimation

5.1 Introduction

Life Cycle Cost (LCC) analyses have been performed in accordance with the methodology provided in Subpart A of 10 CFR Part 436 and in NBS Handbook 135 (Rev.),



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"Life Cycle Costing Manual for the Federal Energy Management Program."

Based on the three options for equipment and facility design, a life cycle cost was developed assuming a 20 year operation (commensurate with concurrent decommissioning with HWVP). The life cycle costs were based on the following elements:

Estimated Actual Construction Cost

Operating personnel requirements, including:

- Management and administrative personnel
- Operating personnel
- Maintenance personnel
- Operating Contractor Support Personnel
- Laboratory Personnel

Maintenance Materials

Utility Requirements, including:

- Electricity Service
- Steam Service

Consumable Chemicals and Catalysts

Decommissioning

Fixed Operational Cost Assessments

5.2 Assumptions and Sources of Data



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The estimated actual construction cost estimate was taken from the Fluor construction cost estimate, considering contingency, but not escalation, in accordance with the guidelines given in NBS Handbook 135 (Rev.).

Decommissioning costs were considered as a negative net salvage value for the plant, occurring in the year following the last year of operation of HWVP. These costs were set at ten percent of the estimated total construction cost.

Operating and maintenance personnel requirements were factored from HWVP staffing requirements given in the HWVP Technical Data Package (SD-HWV-DP-001) for operation, maintenance, and management and support personnel requirements, with HWVP estimates for laboratory personnel and Operating Contractor support personnel (Total plant staff of 250). The stand alone pre-treatment plant staffing (250) was assumed to be 75% of HWVP plant staffing (290) and the co-located and integrated facility staffing was reduced by 35 individuals to account for shared management, administrative, and maintenance service personnel.

Maintenance material costs were estimated to be four percent of installed equipment capital costs per year, based on the material component of maintenance being equal to approximately one-half of the estimated maintenance costs. (Total maintenance is estimated at eight percent of installed equipment capital costs per year, per Perry's Chemical Engineers Handbook, but the labor component is factored into the plant population.)



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Utility requirements were estimated as follows:

Steam service was based on the use of an electric boiler for process steam, in accordance with Hanford current objectives for "zero discharge" of wastes. Process steam is required for 50 percent of annual time based on an assumed 50 percent availability factor assumed. Operating steam loads were assumed to be 2/3 of total design steam load, commensurate with anticipated parallel and batch processing operation.

Electrical service was based on normal operation for HVAC and HVAC header and chiller equipment, adjusted for seasonal variations in load. Process electrical loads were based on an operating time of 50 percent per year. Lighting loads were based on a uniform lighting of 2 watts per square foot.

Consumable chemicals and catalysts include the estimated annual consumption of chemicals for two ten-year campaigns, with the NCAW, NCRW, CC and PFP wastes being processed over the first 10 years, and the SST waste processed over the second 10 years.

In the Life Cycle Cost analysis, radwaste costs were assumed to be zero for all alternatives, since the radwastes produced by all alternatives will be returned to the tank farms for final disposal as Low Level Waste. The cost and schedule for this radwaste disposition is not considered part of the pretreatment LCC.



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Fixed Operational Cost Assessments for research and engineering technology, service contracts, rail service, laundry, waste disposal, and phone service, etc., were factored from HWVP estimates for similar assessments, and were fixed at \$1,000,000 per year before contingency.

All of the above operating costs were increased by a 20 percent contingency factor in the LCC estimate.

5.3 Life Cycle Cost Worksheets

The attached pages provide LCC Worksheets prepared for the three pre-treatment facility concepts. These worksheets include the project description, components of life cycle costs, schedules for escalation adjusted uniform present worth factors for all LCC components, and completed LCC Worksheets for Energy, O&M Costs, and for calculating the Total Life Cycle Cost (TLCC).

6.0 Recommendations of Areas for Further Study

During the evaluation of the three pre-treatment alternatives, several areas surfaced that Fluor Daniel feels warrant further study. The recommendations for further study are noted below:

- 6.1 The estimates were prepared without the benefit of process flow diagrams, Functional Design Criteria, and Technical Data Package, which could significantly affect the ultimate facility cost. It is recommended that process flow diagrams and accompanying criteria/data packages be developed to support a higher level of confidence in the estimated TEC.

ENGINEERING STUDY
LIFE CYCLE COST ESTIMATION
STAND ALONE PRETREATMENT FACILITY
FLUOR DANIEL, INC.

=====

NEW BUILDING DESIGN LCC WORKSHEETS

1. PROJECT DESCRIPTION

AGENCY: Department of Energy

ADDRESS: STREET
CITY/COUNTY Hanford
STATE Washington
DOE REGION 10

PROJECT CONTACT PERSON: NAME
POSITION
TELEPHONE

BUILDING OR FACILITY DESCRIPTION: INDUSTRIAL FACILITY - STAND ALONE PRETREATMENT FACILITY

CLASSIFICATION FOR ENERGY CHARGES: Industrial

PROJECT DESCRIPTION: High Level waste processing facility including buildings, installation of all equipment, offsites and engineering

EXPECTED BUILDING OR SYSTEM LIFE: 40 years or greater

ESTIMATED BUILDING OR SYSTEM INVESTMENT COST: \$460,000,000 Pretreatment Plant (total installed cost)
\$0 HWVP Additions (total installed cost)

ENERGY INFORMATION:

Energy Type: Electricity
=====

Annual Quantity	Price Unit
3.60E+07 kwh	\$0.0294 per kwh

Energy Type: Steam
=====

Annual Quantity	Price Unit
9.980E+07 lb	\$9.50 per 1000 lb

PERIOD OF STUDY: 2003 (start-up) To 2022 (end year)

NO OF YRS COVERED: 20 BASE YEAR: 1988
=====

DISCOUNT RATE: 10%
=====

ENGINEERING STUDY
LIFE CYCLE COST ESTIMATION
STAND ALONE PRETREATMENT FACILITY
FLUOR DANIEL, INC.

NEW BUILDING DESIGN LCC WORKSHEETS (Continued)

A. Calculating the Present Value of Energy Costs

Type	(1) Annual Units Purchased	(2) Base-Year Energy Price Per Unit	(3) Base-Year Energy Costs	(4) Escal. Adjusted Present Worth Factor	(5) Present Value of Energy Cost
Electricity - kwh	3.60E+07	(per kwh) \$0.0294	\$1,058,000	2.7810	\$2,942,000
		Base Charge			
		Demand			
		Time of Day			
		Capacity			
		Other			
Steam - lbs	9.980E+07	(per 1000 lb) \$ \$9.50	\$948,000	2.7810	\$2,636,000
TOTAL	xxxx	xxxx	xxxx	xxxx	\$5,578,000

B. Calculating Investment Costs for the New Building Design

(1) PV Estimated Actual Investment Costs for the New Building Design		
	Pretreatment Plant	\$177,928,000
	HWVP Additions	\$0
(2) Investment Cost Adjustment Factor	X	1
(3) Adjusted Investment Costs		\$177,928,000

ENGINEERING STUDY
LIFE CYCLE COST ESTIMATION
STAND ALONE PRETREATMENT FACILITY
FLUOR DANIEL, INC.

NEW BUILDING DESIGN LCC WORKSHEETS (Continued)

C. Calculating the Annually Recurring (Nonfuel) Operation and Maintenance (O&M) Costs

Item	(1) Amount of Annually Recurring Costs in Base Year Dollars	(2) Modified UPW Factor	(3) Present Value of Annually Recurring Costs
Normal Maintenance Materials	8,640,000	2.2419	\$19,370,000
Operating & Maintenance Labor	18,260,000	2.2419	\$40,937,000
Consum Chem Usage - 1st 10 yr	2,640,000	1.6181	\$4,272,000
Consum Chem Usage - 2nd 10 yr	1,750,000	0.6238	\$1,092,000
Radwaste Disposal Costs	0	2.2419	\$0
Fixed Operational Cost Assessments	1,200,000	2.2419	\$2,690,000
TOTAL	xxxx	xxxx	\$68,361,000

ENGINEERING STUDY
LIFE CYCLE COST ESTIMATION
STAND ALONE PRETREATMENT FACILITY
FLUOR DANIEL, INC.

NEW BUILDING DESIGN LCC WORKSHEETS (Continued)

D. Calculating Nonannually Recurring (Nonfuel) O&M Costs, Replacement Costs, and Salvage Value

(1) Year in Which Expenditure to Occur	(2) Amount of Non- Annually Recurring O&M Cost (Base Year \$)	(3) Amount of Replacement Cost (Base Year \$)	(4) Amount of Salvage Value (Base Year \$)	(5) SPW Factors	(6) PV of Non- Annually Recurring O&M	(7) PV of Replacement	(8) PV of Salvage Value
2023	Decontamination & Decommissioning		(46,000,000)	0.0356			(1,636,869)
TOTAL	xxxx	xxxx	xxxx	xxxx			(1,637,000)

E. Calculating the TLCC

(1) Present Value Energy Costs	\$5,578,000
(2) Present Value Adjusted Investment Costs	+ \$177,928,000
(3) Present Value of Annually Recurring (Nonfuel) O&M Costs	+ \$68,361,000
(4) Present Value of Nonannually Recurring (Nonfuel) O&M Costs	+ \$0
(5) Present Value of Replacement Costs	+ \$0
(6) Present Value of Salvage	- (\$1,637,000)
(7) TLCC of the New Building or System Design	= \$253,504,000

ENGINEERING STUDY
LIFE CYCLE COST ESTIMATION
STAND ALONE PRETREATMENT FACILITY
FLUOR DANIEL, INC.

BASE YEAR = 1988 COMPONENTS OF LIFE CYCLE COSTS

Component	Estimate Year	Cost Frequency	Estimated Nominal \$	Constant Dollar; Escalation Rate	Base Year Estimate Constant Dollars
Equiv. Total Installed Cost					
Pretreatment Plant	1988	Lump Sum	\$460,000,000	0	460,000,000
HWVF Additions	1988	Lump Sum	0	0	0
Salvage Value(Decommissioning)	1988	Lump Sum	(46,000,000)	0	(46,000,000)
Normal Maintenance Materials	1988	Annual	8,640,000	0	8,640,000
Operating & Maint. Labor(*)	1988	Annual	18,260,000	0	18,260,000
Elect. Energy Usage Costs(*)	1988	Annual	1,058,400	Per Sched. A	1,058,400
Steam Usage(*)	1988	Annual	948,100	Per Sched. A (elec boiler)	948,100
Consum Chem Usage 1st 10 yr(*)	1988	Annual	2,640,000	0	2,640,000
Consum Chem Usage 2nd 10 yr(*)	1988	Annual	1,750,000	0	1,750,000
Radwaste Disposal Costs(*)	1988	Annual	0	0	0
Fixed Oper. Cost Assess'ts(*)	1988	Annual	1,200,000	0	1,200,000
Note: The values for asterisked (*) components of Life Cycle Costs include a 20% contingency					

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ENGINEERING STUDY
LIFE CYCLE COST ESTIMATION
STAND ALONE PRETREATMENT FACILITY
FLUOR DANIEL, INC.

SCHEDULE A
ADJUSTED UNIFORM PRESENT WORTH FACTOR
FOR INDUSTRIAL ELECTRICITY

(Ref: WHC & Table Cb-10, Region 10, NBS Publication 709)

Year	Rate	Factor	PV @ 10%	Mod PV	UPW
1988	5.00%	1.0000	1.0000	1.0000	1.0000
1989	-0.85%	0.9915	0.9091	0.9014	1.9014
1990	2.10%	1.0123	0.8264	0.8366	2.7380
1991	2.10%	1.0336	0.7513	0.7765	3.5145
1992	2.10%	1.0553	0.6830	0.7208	4.2353
1993	2.10%	1.0774	0.6209	0.6690	4.9043
1994	2.10%	1.1001	0.5645	0.6210	5.5253
1995	1.60%	1.1177	0.5132	0.5735	6.0988
1996	1.60%	1.1356	0.4665	0.5297	6.6286
1997	1.60%	1.1537	0.4241	0.4893	7.1179
1998	1.60%	1.1722	0.3855	0.4519	7.5698
1999	1.60%	1.1909	0.3505	0.4174	7.9872
2000	0.98%	1.2026	0.3186	0.3832	8.3704
2001	0.98%	1.2144	0.2897	0.3518	8.7222
2002	0.98%	1.2263	0.2633	0.3229	9.0451
2003	0.98%	1.2383	0.2394	0.2964	9.3415
2004	0.98%	1.2505	0.2176	0.2721	9.6137
2005	-0.22%	1.2477	0.1978	0.2469	9.8605
2006	-0.22%	1.2450	0.1799	0.2239	10.0844
2007	-0.22%	1.2422	0.1635	0.2031	10.2875
2008	-0.22%	1.2395	0.1486	0.1842	10.4718
2009	-0.22%	1.2368	0.1351	0.1671	10.6389
2010	0.00%	1.2368	0.1228	0.1519	10.7908
2011	0.00%	1.2368	0.1117	0.1381	10.9290
2012	0.00%	1.2368	0.1015	0.1256	11.0545
2013	0.00%	1.2368	0.0923	0.1141	11.1687
2014	0.00%	1.2368	0.0839	0.1038	11.2724
2015	0.00%	1.2368	0.0763	0.0947	11.3668
2016	0.00%	1.2368	0.0693	0.0858	11.4525
2017	0.00%	1.2368	0.0630	0.0780	11.5305
2018	0.00%	1.2368	0.0573	0.0709	11.6014
2019	0.00%	1.2368	0.0521	0.0644	11.6658
2020	0.00%	1.2368	0.0474	0.0586	11.7244
2021	0.00%	1.2368	0.0431	0.0533	11.7776
2022	0.00%	1.2368	0.0391	0.0484	11.8261
2023	0.00%	1.2368	0.0356	0.0440	11.8701
2024	0.00%	1.2368	0.0323	0.0400	11.9101
2025	0.00%	1.2368	0.0294	0.0364	11.9464

SCHEDULE B
ESCALATION ADJUSTED UNIFORM PRESENT WORTH FACTOR
FOR COAL FUELED INDUSTRIAL ENERGY

(Ref: Table Cb-10, Region 10, NBS Publication 709)

Year	Rate	Factor	PV @ 10%	Mod PV	UPW
1989	1.16%	1.0000	0.9091	0.9091	0.9091
1990	1.16%	1.0116	0.8264	0.8360	1.7451
1991	1.43%	1.0261	0.7513	0.7709	2.5160
1992	1.43%	1.0407	0.6830	0.7108	3.2269
1993	1.43%	1.0556	0.6209	0.6555	3.8823
1994	1.43%	1.0707	0.5645	0.6044	4.4867
1995	1.43%	1.0860	0.5132	0.5573	5.0440
1996	1.27%	1.0998	0.4665	0.5131	5.5571
1997	1.27%	1.1138	0.4241	0.4724	6.0294
1998	1.27%	1.1279	0.3855	0.4349	6.4643
1999	1.27%	1.1423	0.3505	0.4004	6.8647
2000	1.27%	1.1568	0.3186	0.3686	7.2332
2001	0.78%	1.1658	0.2897	0.3377	7.5709
2002	0.78%	1.1749	0.2633	0.3094	7.8803
2003	0.78%	1.1840	0.2394	0.2835	8.1638
2004	0.78%	1.1933	0.2176	0.2597	8.4235
2005	0.78%	1.2026	0.1978	0.2379	8.6614
2006	0.70%	1.2110	0.1799	0.2178	8.8792
2007	0.70%	1.2195	0.1635	0.1994	9.0786
2008	0.70%	1.2280	0.1486	0.1825	9.2611
2009	0.70%	1.2366	0.1351	0.1671	9.4282
2010	0.70%	1.2453	0.1228	0.1530	9.5812
2011	0.70%	1.2540	0.1117	0.1400	9.7213
2012	0.70%	1.2628	0.1015	0.1282	9.8495
2013	0.70%	1.2716	0.0923	0.1174	9.9669
2014	0.70%	1.2805	0.0839	0.1074	10.0743
2015	0.70%	1.2895	0.0763	0.0984	10.1726
2016	0.70%	1.2985	0.0693	0.0900	10.2627
2017	0.70%	1.3076	0.0630	0.0824	10.3451
2018	0.70%	1.3167	0.0573	0.0755	10.4206
2019	0.70%	1.3260	0.0521	0.0691	10.4896
2020	0.70%	1.3352	0.0474	0.0632	10.5529
2021	0.70%	1.3446	0.0431	0.0579	10.6108
2022	0.70%	1.3540	0.0391	0.0530	10.6638
2023	0.70%	1.3635	0.0356	0.0485	10.7123
2024	0.70%	1.3730	0.0323	0.0444	10.7567
2025	0.70%	1.3826	0.0294	0.0407	10.7974
2026	0.70%	1.3923	0.0267	0.0372	10.8346

ENGINEERING STUDY
LIFE CYCLE COST ESTIMATION
STAND ALONE PRETREATMENT FACILITY
FLUOR DANIEL, INC.

SCHEDULE C
ESCALATION ADJUSTED UNIFORM PRESENT WORTH FACTOR
FOR 50% SCHEDULE C & 50% ZERO ESCALATION
(End of Year Payments)

Year	Rate	Factor	PV @ 10%	Mod PV	UPW
1989	0.58%	1.0090	0.9091	0.9091	0.9091
1990	0.58%	1.0058	0.8264	0.8312	1.7403
1991	0.72%	1.0130	0.7513	0.7611	2.5014
1992	0.72%	1.0202	0.6830	0.6968	3.1982
1993	0.72%	1.0275	0.6209	0.6386	3.8363
1994	0.72%	1.0349	0.5645	0.5842	4.4204
1995	0.72%	1.0423	0.5132	0.5349	4.9553
1996	0.64%	1.0489	0.4665	0.4893	5.4446
1997	0.64%	1.0556	0.4241	0.4477	5.8922
1998	0.64%	1.0623	0.3855	0.4095	6.3018
1999	0.64%	1.0690	0.3505	0.3747	6.6765
2000	0.64%	1.0758	0.3186	0.3428	7.0192
2001	0.39%	1.0800	0.2897	0.3128	7.3321
2002	0.39%	1.0842	0.2633	0.2855	7.6176
2003	0.39%	1.0884	0.2394	0.2606	7.8781
2004	0.39%	1.0927	0.2176	0.2378	8.1159
2005	0.39%	1.0969	0.1978	0.2170	8.3330
2006	0.35%	1.1008	0.1799	0.1980	8.5309
2007	0.35%	1.1046	0.1635	0.1806	8.7116
2008	0.35%	1.1085	0.1486	0.1648	8.8763
2009	0.35%	1.1124	0.1351	0.1503	9.0266
2010	0.35%	1.1163	0.1228	0.1371	9.1638
2011	0.35%	1.1202	0.1117	0.1251	9.2889
2012	0.35%	1.1241	0.1015	0.1141	9.4030
2013	0.35%	1.1280	0.0923	0.1041	9.5071
2014	0.35%	1.1320	0.0839	0.0950	9.6021
2015	0.35%	1.1359	0.0763	0.0866	9.6887
2016	0.35%	1.1399	0.0693	0.0790	9.7678
2017	0.35%	1.1439	0.0630	0.0721	9.8399
2018	0.35%	1.1479	0.0573	0.0658	9.9057
2019	0.35%	1.1519	0.0521	0.0600	9.9657
2020	0.35%	1.1560	0.0474	0.0547	10.0204
2021	0.35%	1.1600	0.0431	0.0499	10.0704
2022	0.35%	1.1641	0.0391	0.0456	10.1159
2023	0.00%	1.1641	0.0356	0.0414	10.1574
2024	0.35%	1.1681	0.0323	0.0378	10.1952
2025	0.35%	1.1722	0.0294	0.0345	10.2296
2026	0.35%	1.1763	0.0267	0.0314	10.2611
2027	0.35%	1.1804	0.0243	0.0287	10.2898

SCHEDULE D
ADJUSTED UNIFORM PRESENT WORTH FACTOR
FOR NO ESCALATION
(End of Year Payments)

Year	Rate	Factor	PV @ 10%	Mod PV	UPW
1989	0.00%	1.0000	0.9091	0.9091	0.9091
1990	0.00%	1.0000	0.8264	0.8264	1.7355
1991	0.00%	1.0000	0.7513	0.7513	2.4869
1992	0.00%	1.0000	0.6830	0.6830	3.1699
1993	0.00%	1.0000	0.6209	0.6209	3.7908
1994	0.00%	1.0000	0.5645	0.5645	4.3553
1995	0.00%	1.0000	0.5132	0.5132	4.8684
1996	0.00%	1.0000	0.4665	0.4665	5.3349
1997	0.00%	1.0000	0.0000	0.0000	5.3349
1998	0.00%	1.0000	0.3855	0.3855	5.7205
1999	0.00%	1.0000	0.3505	0.3505	6.0710
2000	0.00%	1.0000	0.3186	0.3186	6.3896
2001	0.00%	1.0000	0.2897	0.2897	6.6793
2002	0.00%	1.0000	0.2633	0.2633	6.9426
2003	0.00%	1.0000	0.2394	0.2394	7.1820
2004	0.00%	1.0000	0.2176	0.2176	7.3956
2005	0.00%	1.0000	0.1978	0.1978	7.5975
2006	0.00%	1.0000	0.1799	0.1799	7.7773
2007	0.00%	1.0000	0.1635	0.1635	7.9408
2008	0.00%	1.0000	0.1486	0.1486	8.0895
2009	0.00%	1.0000	0.1351	0.1351	8.2246
2010	0.00%	1.0000	0.1228	0.1228	8.3474
2011	0.00%	1.0000	0.1117	0.1117	8.4591
2012	0.00%	1.0000	0.1015	0.1015	8.5606
2013	0.00%	1.0000	0.0923	0.0923	8.6529
2014	0.00%	1.0000	0.0839	0.0839	8.7368
2015	0.00%	1.0000	0.0763	0.0763	8.8131
2016	0.00%	1.0000	0.0693	0.0693	8.8825
2017	0.00%	1.0000	0.0630	0.0630	8.9455
2018	0.00%	1.0000	0.0573	0.0573	9.0028
2019	0.00%	1.0000	0.0521	0.0521	9.0549
2020	0.00%	1.0000	0.0474	0.0474	9.1023
2021	0.00%	1.0000	0.0431	0.0431	9.1453
2022	0.00%	1.0000	0.0391	0.0391	9.1845
2023	0.00%	1.0000	0.0356	0.0356	9.2201
2024	0.00%	1.0000	0.0323	0.0323	9.2524
2025	0.00%	1.0000	0.0294	0.0294	9.2818
2026	0.00%	1.0000	0.0267	0.0267	9.3086
2027	0.00%	1.0000	0.0243	0.0243	9.3329

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ENGINEERING STUDY
LIFE CYCLE COST ESTIMATION
STAND ALONE PRETREATMENT FACILITY
FLUOR DANIEL, INC.

SCHEDULE E
CONSTRUCTION ESCALATION TABLE
USING ZERO ESCALATION
(millions of dollars)

Year	PRETREATMENT PLANT					HWVP ADDITIONS				
	Percent Expend.	Estimate 1988 \$	Escal- ator	Est. in Const \$	PV Expend.	Percent Expend.	Estimate 1988 \$	Escal- ator	Est. in Const \$	PV Expend.
1988	0%	0.0	1.00	0.0	0.0	0%	0.0	1.00	0.0	0.0
1989	0%	0.0	1.00	0.0	0.0	0%	0.0	1.00	0.0	0.0
1990	0%	0.0	1.00	0.0	0.0	0%	0.0	1.00	0.0	0.0
1991	0%	0.0	1.00	0.0	0.0	0%	0.0	1.00	0.0	0.0
1992	0%	0.0	1.00	0.0	0.0	0%	0.0	1.00	0.0	0.0
1993	1%	4.6	1.00	4.6	2.9	0%	0.0	1.00	0.0	0.0
1994	3%	13.8	1.00	13.8	7.8	0%	0.0	1.00	0.0	0.0
1995	4%	18.4	1.00	18.4	9.4	0%	0.0	1.00	0.0	0.0
1996	10%	46.0	1.00	46.0	21.5	0%	0.0	1.00	0.0	0.0
1997	15%	69.0	1.00	69.0	29.3	0%	0.0	1.00	0.0	0.0
1998	24%	110.4	1.00	110.4	42.6	0%	0.0	1.00	0.0	0.0
1999	22%	101.2	1.00	101.2	35.5	0%	0.0	1.00	0.0	0.0
2000	11%	50.6	1.00	50.6	16.1	0%	0.0	1.00	0.0	0.0
2001	7%	32.2	1.00	32.2	9.3	0%	0.0	1.00	0.0	0.0
2002	3%	13.8	1.00	13.8	3.6	0%	0.0	1.00	0.0	0.0
2003	0%	0.0	1.00	0.0	0.0	0%	0.0	1.00	0.0	0.0
2004	0%	0.0	1.00	0.0	0.0	0%	0.0	1.00	0.0	0.0
	100%	460.0	XXX	460.0	177.9	0%	0.0	XXX	0.0	0.0

ENGINEERING STUDY
LIFE CYCLE COST ESTIMATION
COLOCATED PRETREATMENT FACILITY
FLUOR DANIEL, INC.

=====

NEW BUILDING DESIGN LCC WORKSHEETS

I. PROJECT DESCRIPTION

AGENCY: Department of Energy

ADDRESS: STREET
CITY/COUNTY Hanford
STATE Washington
DOE REGION 10

PROJECT CONTACT PERSON: NAME
POSITION
TELEPHONE

BUILDING OR FACILITY DESCRIPTION: INDUSTRIAL FACILITY - COLOCATED PRETREATMENT FACILITY

CLASSIFICATION FOR ENERGY CHARGES: Industrial

PROJECT DESCRIPTION: High Level waste processing facility including buildings, installation of all equipment, offsites and engineering

EXPECTED BUILDING OR SYSTEM LIFE: 40 years or greater

ESTIMATED BUILDING OR SYSTEM INVESTMENT COST: \$392,000,000 Pretreatment Plant (total installed cost)
\$44,000,000 HMVP Additions (total installed cost)

ENERGY INFORMATION:

Energy Type: Electricity
=====

Annual Quantity	Price Unit
3.53E+07 kwh	\$0.0294 per kwh

Energy Type: Steam
=====

Annual Quantity	Price Unit
9.980E+07 lb	\$9.50 per 1000 lb

PERIOD OF STUDY: 2003 (start-up) To 2022 (end year)

NO OF YRS COVERED: 20 BASE YEAR: 1988
=====

DISCOUNT RATE: 10%
=====

ENGINEERING STUDY
LIFE CYCLE COST ESTIMATION
COLLOCATED PRETREATMENT FACILITY
FLUOR DANIEL, INC.

NEW BUILDING DESIGN LCC WORKSHEETS (Continued)

A. Calculating the Present Value of Energy Costs

Type	(1) Annual Units Purchased	(2) Base-Year Energy Price Per Unit	(3) Base-Year Energy Costs	(4) Escal. Adjusted Present Worth Factor	(5) Present Value of Energy Cost
Electricity - kwh	3.53E+07	(per kwh) \$0.0294	\$1,038,000	2.7810	\$2,887,000
		Base Charge			
		Demand			
		Time of Day			
		Capacity			
		Other			
Steam - lbs	9.980E+07	(per 1000 lb) \$ \$9.50	\$948,000	2.7810	\$2,636,000
TOTAL	xxxx	xxxx	xxxx	xxxx	\$5,523,000

B. Calculating Investment Costs for the New Building Design

(1) PV Estimated Actual Investment Costs for the New Building Design		
	Pretreatment Plant	\$151,626,000
	HWVP Additions	\$27,179,000
(2) Investment Cost Adjustment Factor	X	1
(3) Adjusted Investment Costs		\$178,805,000

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ENGINEERING STUDY
LIFE CYCLE COST ESTIMATION
COLOCATED PRETREATMENT FACILITY
FLUOR DANIEL, INC.

NEW BUILDING DESIGN LCC WORKSHEETS (Continued)

C. Calculating the Annually Recurring (Nonfuel) Operation and Maintenance (O&M) Costs

Item	(1) Amount of Annually Recurring Costs in Base Year Dollars	(2) Modified UPW Factor	(3) Present Value of Annually Recurring Costs
Normal Maintenance Materials	8,080,000	2.2419	\$18,114,000
Operating & Maintenance Labor	14,890,000	2.2419	\$33,382,000
Consum Chem Usage - 1st 10 yr	2,640,000	1.6181	\$4,272,000
Consum Chem Usage - 2nd 10 yr	1,750,000	0.6238	\$1,092,000
Radwaste Disposal Costs	0	2.2419	\$0
Fixed Operational Cost Assessments	1,200,000	2.2419	\$2,690,000
TOTAL	xxxx	xxxx	\$59,550,000

ENGINEERING STUDY
LIFE CYCLE COST ESTIMATION
COLOCATED PRETREATMENT FACILITY
FLUOR DANIEL, INC.

NEW BUILDING DESIGN LCC WORKSHEETS (Continued)

D. Calculating Nonannually Recurring (Nonfuel) O&M Costs, Replacement Costs, and Salvage Value

(1) Year in Which Expenditure to Occur	(2) Amount of Non- Annually Recurring O&M (Base Year \$)	(3) Amount of Replacement Cost (Base Year \$)	(4) Amount of Salvage Value (Base Year \$)	(5) SPW Factors	(6) PV of Non- Annually Recurring O&M	(7) PV of Replacement	(8) PV of Salvage Value
2023	Decontamination & Decommissioning		(43,600,000)	0.0356			(1,551,467)
TOTAL	xxxx	xxxx	xxxx	xxxx			(1,551,000)

E. Calculating the TLCC

(1) Present Value Energy Costs	\$5,523,000
(2) Present Value Adjusted Investment Costs	+ \$178,805,000
(3) Present Value of Annually Recurring (Nonfuel) O&M Costs	+ \$59,550,000
(4) Present Value of Nonannually Recurring (Nonfuel) O&M Costs	+ \$0
(5) Present Value of Replacement Costs	+ \$0
(6) Present Value of Salvage	- (\$1,551,000)
(7) TLCC of the New Building or System Design	= \$245,429,000

ENGINEERING STUDY
LIFE CYCLE COST ESTIMATION
COLOCATED PRETREATMENT FACILITY
FLUDR DANIEL, INC.

BASE YEAR = 1988 COMPONENTS OF LIFE CYCLE COSTS

Component	Estimate Year	Cost Frequency	Estimated Nominal \$	Constant Dollar Escalation Rate	Base Year Estimate Constant Dollars
Equiv. Total Installed Cost					
Pretreatment Plant	1988	Lump Sum	\$392,000,000	0	392,000,000
HWVP Additions	1988	Lump Sum	44,000,000	0	44,000,000
Salvage Value(Decommissioning)	1988	Lump Sum	(43,600,000)	0	(43,600,000)
Normal Maintenance Materials	1988	Annual	8,080,000	0	8,080,000
Operating & Maint. Labor(*)	1988	Annual	14,890,000	0	14,890,000
Elect. Energy Usage Costs(*)	1988	Annual	1,037,820	Per Sched. A	1,037,820
Steam Usage(*)	1988	Annual	948,100	Per Sched. A (elec boiler)	948,100
Consum Chem Usage 1st 10 yr(*)	1988	Annual	2,640,000	0	2,640,000
Consum Chem Usage 2nd 10 yr(*)	1988	Annual	1,750,000	0	1,750,000
Radwaste Disposal Costs(*)	1988	Annual	0	0	0
Fixed Oper. Cost Assess'ts(*)	1988	Annual	1,200,000	0	1,200,000
Note: The values for asterisked (*) components of Life Cycle Costs include a 20% contingency					

ENGINEERING STUDY
LIFE CYCLE COST ESTIMATION
COLOCATED PRETREATMENT FACILITY
FLUOR DANIEL, INC.

SCHEDULE E
CONSTRUCTION ESCALATION TABLE
USING ZERO ESCALATION
(millions of dollars)

Year	PRETREATMENT PLANT					HWVP ADDITIONS				
	Percent Expended	Estimate 1988 \$	Escal- ator	Est. in Const \$	PV Expend.	Percent Expended	Estimate 1988 \$	Escal- ator	Est. in Const \$	PV Expend.
1988	0%	0.0	1.00	0.0	0.0	1%	0.4	1.00	0.4	0.4
1989	0%	0.0	1.00	0.0	0.0	2%	0.9	1.00	0.9	0.8
1990	0%	0.0	1.00	0.0	0.0	4%	1.8	1.00	1.8	1.5
1991	0%	0.0	1.00	0.0	0.0	10%	4.4	1.00	4.4	3.3
1992	0%	0.0	1.00	0.0	0.0	15%	6.6	1.00	6.6	4.5
1993	1%	3.9	1.00	3.9	2.4	24%	10.6	1.00	10.6	6.6
1994	3%	11.8	1.00	11.8	6.6	22%	9.7	1.00	9.7	5.5
1995	4%	15.7	1.00	15.7	8.0	11%	4.8	1.00	4.8	2.5
1996	10%	39.2	1.00	39.2	18.3	7%	3.1	1.00	3.1	1.4
1997	15%	58.8	1.00	58.8	24.9	3%	1.3	1.00	1.3	0.6
1998	24%	94.1	1.00	94.1	36.3	1%	0.4	1.00	0.4	0.2
1999	22%	86.2	1.00	86.2	30.2	0%	0.0	1.00	0.0	0.0
2000	11%	43.1	1.00	43.1	13.7	0%	0.0	1.00	0.0	0.0
2001	7%	27.4	1.00	27.4	7.9	0%	0.0	1.00	0.0	0.0
2002	3%	11.8	1.00	11.8	3.1	0%	0.0	1.00	0.0	0.0
2003	0%	0.0	1.00	0.0	0.0	0%	0.0	1.00	0.0	0.0
2004	0%	0.0	1.00	0.0	0.0	0%	0.0	1.00	0.0	0.0
	100%	392.0	XXX	392.0	151.6	100%	44.0	XXX	44.0	27.2

ENGINEERING STUDY
LIFE CYCLE COST ESTIMATION
INTEGRATED PRETREATMENT FACILITY
FLUOR DANIEL, INC.

NEW BUILDING DESIGN LCC WORKSHEETS

I. PROJECT DESCRIPTION

AGENCY: Department of Energy

ADDRESS: STREET
CITY/COUNTY Hanford
STATE Washington
DoE REGION 10

PROJECT CONTACT PERSON: NAME
POSITION
TELEPHONE

BUILDING OR FACILITY DESCRIPTION: INDUSTRIAL FACILITY - INTEGRATED PRETREATMENT FACILITY

CLASSIFICATION FOR ENERGY CHARGES: Industrial

PROJECT DESCRIPTION: High Level waste processing facility including buildings, installation of all equipment, offsites and engineering

EXPECTED BUILDING OR SYSTEM LIFE: 40 years or greater

ESTIMATED BUILDING OR SYSTEM INVESTMENT COST: \$0 Pretreatment Plant (total installed cost)
\$519,000,000 HWVF Additions (total installed cost)

ENERGY INFORMATION:

Energy Type: Electricity
=====

Annual Quantity	Price Unit
3.25E+07 kwh	\$0.0294 per kwh

Energy Type: Steam
=====

Annual Quantity	Price Unit
9.980E+07 lb	\$9.50 per 1000 lb

PERIOD OF STUDY: 2002 (start-up) To 2021 (end year)

NO OF YRS COVERED: 20 BASE YEAR: 1988
=====

DISCOUNT RATE: 10%
=====

ENGINEERING STUDY
LIFE CYCLE COST ESTIMATION
INTEGRATED PRETREATMENT FACILITY
FLUOR DANIEL, INC.

NEW BUILDING DESIGN LCC WORKSHEETS (Continued)

A. Calculating the Present Value of Energy Costs

Type	(1) Annual Units Purchased	(2) Base-Year Energy Price Per Unit	(3) Base-Year Energy Costs	(4) Escal. Adjusted Present Worth Factor	(5) Present Value of Energy Cost
Electricity - kwh	3.25E+07	(per kwh) \$0.0294	\$956,000	3.0555	\$2,921,000
		Base Charge			
		Demand			
		Time of Day			
		Capacity			
		Other			
Steam - lbs	9.980E+07	(per 1000 lb) \$ \$9.50	\$948,000	3.0555	\$2,897,000
TOTAL	xxxx	xxxx	xxxx	xxxx	\$5,818,000

B. Calculating Investment Costs for the New Building Design

(1) PV Estimated Actual Investment Costs for the New Building Design	
Pretreatment Plant	\$0
HNVP Additions	\$250,310,000
(2) Investment Cost Adjustment Factor	X 1
(3) Adjusted Investment Costs	\$250,310,000

ENGINEERING STUDY
LIFE CYCLE COST ESTIMATION
INTEGRATED PRETREATMENT FACILITY
FLUOR DANIEL, INC.

NEW BUILDING DESIGN LCC WORKSHEETS (Continued)

C. Calculating the Annually Recurring (Nonfuel) Operation and Maintenance (O&M) Costs

Item	(1) Amount of Annually Recurring Costs in Base Year Dollars	(2) Modified UPM Factor	(3) Present Value of Annually Recurring Costs
Normal Maintenance Materials	7,880,000	2.4661	\$19,433,000
Operating & Maintenance Labor	14,890,000	2.4661	\$36,720,000
Consum Chem Usage - 1st 10 yr	2,640,000	1.7799	\$4,699,000
Consum Chem Usage - 2nd 10 yr	1,750,000	0.6862	\$1,201,000
Radwaste Disposal Costs	0	2.4661	\$0
Fixed Operational Cost Assessments	1,200,000	2.4661	\$2,959,000
TOTAL	xxxx	xxxx	\$65,012,000

ENGINEERING STUDY
LIFE CYCLE COST ESTIMATION
INTEGRATED PRETREATMENT FACILITY
FLUOR DANIEL, INC.

NEW BUILDING DESIGN LCC WORKSHEETS (Continued)

D. Calculating Nonannually Recurring (Nonfuel) O&M Costs, Replacement Costs, and Salvage Value

(1) Year in Which Expenditure to Occur	(2) Amount of Non- Annually Recurring O&M ((Base Year \$))	(3) Amount of Replacement Cost ((Base Year \$))	(4) Amount of Salvage Value ((Base Year \$))	(5) SPW Factors	(6) PV of Non- Annually Recurring O&M	(7) PV of Replacement	(8) PV of Salvage Value
2027(†)	Decontamination & Decommissioning		(51,900,000)	0.0243			(1,261,399)
(†) Decommissioning with HWVF following 25 yr. vitrification campaign operation.							
TOTAL	xxxx	xxxx	xxxx	xxxx			(1,261,000)

E. Calculating the TLCC

(1) Present Value Energy Costs	\$5,818,000
(2) Present Value Adjusted Investment Costs	+ \$250,310,000
(3) Present Value of Annually Recurring (Nonfuel) O&M Costs	+ \$65,012,000
(4) Present Value of Nonannually Recurring (Nonfuel) O&M Costs	+ \$0
(5) Present Value of Replacement Costs	+ \$0
(6) Present Value of Salvage	- (\$1,261,000)
(7) TLCC of the New Building or System Design	= \$322,401,000

ENGINEERING STUDY
LIFE CYCLE COST ESTIMATION
INTEGRATED PRETREATMENT FACILITY
FLUOR DANIEL, INC.

BASE YEAR = 1988 COMPONENTS OF LIFE CYCLE COSTS

Component	Estimate Year	Cost Frequency	Estimated Nominal \$	Constant Dollar Escalation Rate	Base Year Estimate Constant Dollars
Equiv. Total Installed Cost					
Pretreatment Plant	1988	Lump Sum	\$0	0	0
HW ¹⁰ Additions	1988	Lump Sum	519,000,000	0	519,000,000
Salvage Value (Decommissioning)	1988	Lump Sum	(51,900,000)	0	(51,900,000)
Normal Maintenance Materials	1988	Annual	7,880,000	0	7,880,000
Operating & Maint. Labor(*)	1988	Annual	14,890,000	0	14,890,000
Elect. Energy Usage Costs(*)	1988	Annual	955,500	Per Sched. A	955,500
Steam Usage(*)	1988	Annual	948,100	Per Sched. A (elec boiler)	948,100
Consum Chem Usage 1st 10 yr(*)	1988	Annual	2,640,000	0	2,640,000
Consum Chem Usage 2nd 10 yr(*)	1988	Annual	1,750,000	0	1,750,000
Radwaste Disposal Costs(*)	1988	Annual	0	0	0
Fixed Oper. Cost Assess'ts(*)	1988	Annual	1,200,000	0	1,200,000

Note: The values for asterisked (*) components of Life Cycle Costs include a 20% contingency

ENGINEERING STUDY
LIFE CYCLE COST ESTIMATION
INTEGRATED PRETREATMENT FACILITY
FLUOR DANIEL, INC.

SCHEDULE E
CONSTRUCTION ESCALATION TABLE
USING ZERO ESCALATION
(millions of dollars)

Year	PRETREATMENT PLANT					HWPV ADDITIONS				
	Percent Expend.	Estimate 1988 \$	Escal- ator	Est. in Const \$	PV Expend.	Percent Expend.	Estimate 1988 \$	Escal- ator	Est. in Const \$	PV Expend.
1988	0%	0.0	1.00	0.0	0.0	0%	0.0	1.00	0.0	0.0
1989	0%	0.0	1.00	0.0	0.0	0%	0.0	1.00	0.0	0.0
1990	0%	0.0	1.00	0.0	0.0	1%	5.2	1.00	5.2	4.3
1991	0%	0.0	1.00	0.0	0.0	2%	10.4	1.00	10.4	7.8
1992	0%	0.0	1.00	0.0	0.0	4%	20.8	1.00	20.8	14.2
1993	0%	0.0	1.00	0.0	0.0	10%	51.9	1.00	51.9	32.2
1994	0%	0.0	1.00	0.0	0.0	13%	67.5	1.00	67.5	38.1
1995	0%	0.0	1.00	0.0	0.0	15%	77.9	1.00	77.9	39.9
1996	0%	0.0	1.00	0.0	0.0	15%	77.9	1.00	77.9	36.3
1997	0%	0.0	1.00	0.0	0.0	13%	67.5	1.00	67.5	28.6
1998	0%	0.0	1.00	0.0	0.0	10%	51.9	1.00	51.9	20.0
1999	0%	0.0	1.00	0.0	0.0	8%	41.5	1.00	41.5	14.6
2000	0%	0.0	1.00	0.0	0.0	6%	28.5	1.00	28.5	9.1
2001	0%	0.0	1.00	0.0	0.0	3%	15.6	1.00	15.6	4.5
2002	0%	0.0	1.00	0.0	0.0	1%	2.6	1.00	2.6	0.7
2003	0%	0.0	1.00	0.0	0.0	0%	0.0	1.00	0.0	0.0
2004	0%	0.0	1.00	0.0	0.0	0%	0.0	1.00	0.0	0.0
	0%	0.0	xxx	0.0	0.0	100%	519.0	xxx	519.0	250.3



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- 6.2 A facility plot plan was not prepared for the three pre-treatment alternatives. It is recommended that plot layouts be developed to support subsequent studies of the alternatives. As an example, for the co-located facility, a preferred location was identified at the current location of canister storage building (in close proximity to the sandfilter). A plot layout would confirm the location and establish more exact estimates of supporting utilities, piping, tunnels and ducting.
- 6.3 After development of process flow diagrams, the cell arrangement and configuration should be verified.
- 6.4 The use of the overhead cranes should be studied to verify the canyon size, both in length and height, and to establish availability under various scenarios.
- 6.5 Manipulator repair space was allocated based on a subjective evaluation of each pre-treatment alternatives. It is recommended that the manipulator repair area/areas be studied in greater detail considering time/motion analyses.
- 6.6 Areas such as the Operations Control building and Regulated Entrance Facility were factored from known HWVP requirements for each pre-treatment alternative. These requirements should be studied in greater detail.
- 6.7 Failed Equipment Handling for each pre-treatment alternative assumed three cells were required to maintain plant availability. The failed equipment handling requirements deserve further study.



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- 6.8 Steam utilization and the use of electric steam versus 200 Area steam should be investigated in greater detail.
- 6.9 Utilization of cold chemical tankage, including consideration of cold chemical tank location, should be evaluated in greater detail.
- 6.10 The use of shared facilities for the co-located and integrated facilities needs to be explored in greater depth. Approximations and factors were used in preparing the current "first-pass" evaluation.
- 6.11 A risk analysis is recommended to determine the extent of technology development needed for conceptual, preliminary and detailed designs. Examination of Design parameters may permit a "fast track" approach to definition of the pre-treatment facilities.
- 6.12 The pumping distances involved and the logistics of pumping, sampling, blending, draining and feeding, while maintaining steady plant operations, requires study to determine if additional IAG storage tanks are required and where they should be located.
- 6.13 Further study of process tank location would develop preference between cell location and vault location for tanks such as the Low Level Waste.
- 6.14 In consideration of SST waste pre-treatment/processing, retrieval methods could involve slurrying the solids from leaking SST tanks in a vault near the tanks or hauling the solids to the pre-treatment plant in shielded transporters. Planning should include further



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studies and development of viable methods of handling the SST wastes.

- 6.15 Sampling and Analytical Facility requirements were assumed equivalent to HWVP. These requirements deserve further study.
- 6.16 The facility fire protection/detection system requirements should be evaluated in greater detail. The potential for an in-cell fire as a result of the selected pre-treatment process may require an in-cell fire protection/detection system.
- 6.17 The pre-treatment schedule should be analyzed to address details such as the pre-treatment development program activities and their integration with HWVP engineering and construction and PSAR and permitting requirements. Funding authorization profiles should be evaluated as well.

APPENDIX A

EQUIPMENT LIST STAND-ALONE FACILITY

65211759

ITEM	LOCATION	QTY	CAPACITY	DIMENSION	MATERIAL
DISSOLVER B	PROCESS CELL	1	42000 GAL	15' WIDE X 15.5' HIGH X 27' LONG	HASTELLOY C-276
DISSOLVER A TRANSFER PUMP A	PROCESS CELL	1			HASTELLOY C-276
DISSOLVER A TRANSFER PUMP B	PROCESS CELL	1			HASTELLOY C-276
DISSOLVER A AGITATOR A	PROCESS CELL	1			HASTELLOY C-276
DISSOLVER A AGITATOR B	PROCESS CELL	1			HASTELLOY C-276
DISSOLVER A SAMPLE PUMP A	PROCESS CELL	1			HASTELLOY C-276
DISSOLVER A TRANSFER PUMP A	PROCESS CELL	1			HASTELLOY C-276
DISSOLVER B TRANSFER PUMP B	PROCESS CELL	1			HASTELLOY C-276
DISSOLVER B AGITATOR A	PROCESS CELL	1			HASTELLOY C-276
DISSOLVER B AGITATOR B	PROCESS CELL	1			HASTELLOY C-276
DISSOLVER B SAMPLE PUMP A	PROCESS CELL	1			HASTELLOY C-276
DISSOLVER B CONDENSER/DE-ENTRAINER	PROCESS CELL	1	10 GPM	MODULE 15' WIDE X 15' HIGH X 20' LONG	STAINLESS STEEL
SLUDGE RECEIVER B	PROCESS CELL	1	25000 GAL	15' WIDE X 15.5' HIGH X 20' LONG	SST 304L
SLUDGE RECEIVER B TRANSFER PUMP A	PROCESS CELL	1			SST 304L
SLUDGE RECEIVER B AGITATOR A	PROCESS CELL	1			SST 304L
SLUDGE RECEIVER B AGITATOR B	PROCESS CELL	1			SST 304L
SLUDGE RECEIVER B SAMPLE PUMP A	PROCESS CELL	1			SST 304L

ITEM	LOCATION	QTY	CAPACITY	DIMENSION	MATERIAL
NO. TOWERS 12 TOWERS @ 4 P X 24" H, W BUBBLE CAP TRAYS	PROCESS CELL	2		MODULE 15" WIDE X 15" HIGH X 20" LONG	STAINLESS STEEL
NO. TOWERS TRANSFER PUMP A	PROCESS CELL	1			
NO. TOWERS PUMP B	PROCESS CELL	1			
FED/RECEIVED NITRIC TANK	PROCESS CELL	1	32000 GAL	15" WIDE X 15.5" HIGH X 22" LONG	STAINLESS STEEL
RECOVERED NITRIC TANK TRANSFER PUMP A	PROCESS CELL	1			
RECOVERED NITRIC TANK AGITATOR A	PROCESS CELL	1			
RECOVERED NITRIC TANK AGITATOR B	PROCESS CELL	1			
SUPERGRATE FEED/RECEIVER A	PROCESS CELL	1	28000 GAL	15" WIDE X 15.5" HIGH X 20" LONG	STAINLESS STEEL
SUPERGRATE FEED/RECEIVER A TRANSFER PUMP A	PROCESS CELL	1			
SUPERGRATE FEED/RECEIVER A AGITATOR A	PROCESS CELL	1			
SUPERGRATE FEED/RECEIVER A AGITATOR B	PROCESS CELL	1			
SUPERGRATE FEED/RECEIVER B	PROCESS CELL	1	28000 GAL	15" WIDE X 15.5" HIGH X 20" LONG	STAINLESS STEEL
SUPERGRATE FEED/RECEIVER B TRANSFER PUMP A	PROCESS CELL	1			
SUPERGRATE FEED/RECEIVER B AGITATOR A	PROCESS CELL	1			
SUPERGRATE FEED/RECEIVER B AGITATOR B	PROCESS CELL	1			
LOW LEVEL WASTE TANK A	PROCESS CELL	1	40000 GAL	15" WIDE X 15.5" HIGH X 27" LONG	STAINLESS STEEL
LOW LEVEL WASTE TANK A TRANSFER PUMP A	PROCESS CELL	1			
LOW LEVEL WASTE TANK A AGITATOR A	PROCESS CELL	1			
LOW LEVEL WASTE TANK A AGITATOR B	PROCESS CELL	1			
LOW LEVEL WASTE TANK B	PROCESS CELL	1	40000 GAL	15" WIDE X 15.5" HIGH X 27" LONG	STAINLESS STEEL
LOW LEVEL WASTE TANK B TRANSFER PUMP A	PROCESS CELL	1			
LOW LEVEL WASTE TANK B AGITATOR A	PROCESS CELL	1			
LOW LEVEL WASTE TANK B AGITATOR B	PROCESS CELL	1			

ITEM	LOCATION	QTY	CAPACITY	DIMENSION	MATERIAL
C6 PRODUCT STORAGE	PROCESS CELL	1	5000 GAL		STAINLESS STEEL
C6 PRODUCT STORAGE TRANSFER PUMP A	PROCESS CELL	1			
C6 PRODUCT STORAGE AGITATOR A	PROCESS CELL	1			
C6 FROG RECEIVER	PROCESS CELL		1000 GAL		STAINLESS STEEL
C6 FROG RECVR COOLING COIL	PROCESS CELL	1			
C6 FROG RECEIVER TRANSFER PUMP A	PROCESS CELL	1			
C6 FEEL RECEIVER AGITATOR A	PROCESS CELL	1			
1 FROG RECEIVER	PROCESS CELL	1	14000 GAL	13.5 DIA X 17.5 HIGH	STAINLESS STEEL
1 FROG RECEIVER COOLING COIL	PROCESS CELL	1			
1 FROG RECEIVER TRANSFER PUMP A	PROCESS CELL	1			
1 ELUANT RECICLE	PROCESS CELL	1	14000 GAL	13.5 DIA X 17.5 HIGH	STAINLESS STEEL
1 ELUANT RECICLE TRANSFER PUMP A	PROCESS CELL	1			
1 ELUANT RECICLE AGITATOR A	PROCESS CELL	1			
1 PUMP TANK	PROCESS CELL	1	1000 GAL		STAINLESS STEEL
1 PUMP TANK COOLING COIL	PROCESS CELL	1			
1 PUMP TANK TRANSFER PUMP A	PROCESS CELL	1			
1 ELUANT TANK AGITATOR A	PROCESS CELL	1			
1 WASTE RECEIVER	PROCESS CELL		2000 GAL		STAINLESS STEEL
1 WASTE RECEIVER COOLING COIL	PROCESS CELL	1			
1 WASTE RECEIVER TRANSFER PUMP A	PROCESS CELL	1			
1 WASTE RECEIVER AGITATOR A	PROCESS CELL	1			
1 FEED STORAGE	PROCESS CELL	1	14000 GAL	13.5 DIA X 13.5 HIGH	STAINLESS STEEL
1 FEED STORAGE COOLING COIL	PROCESS CELL	1			
1 FEED STORAGE TRANSFER PUMP A	PROCESS CELL	1			
1 FEED STORAGE AGITATOR A	PROCESS CELL	1			
1 FEED STORAGE	PROCESS CELL	1	5000 GAL	10 DIA X 10 HIGH	STAINLESS STEEL
1 FEED STORAGE COOLING COIL	PROCESS CELL	1			
1 FEED STORAGE TRANSFER PUMP A	PROCESS CELL	1			

ITEM	LOCATION	QTY	CAPACITY	DIMENSION	MATERIAL
W3 SCRAPPER CONDENSATE RECVR	PROCESS CELL	1	4000 GAL	10' D X 7' H	STAINLESS STEEL
W4 SCRAP CONDST REC COOL COIL					
W4 SCRAPPER CONDENSATE RECVR TRANSFER PUMP #	PROCESS CELL	1			
W4 SCRAPPER CONDENSATE RECVR AGITATOR #	PROCESS CELL	1			
FEED EFFLUENT MODULE EJECTA CENTRIFUGAL CONTRACTORS	PROCESS CELL	1		MODULE 4' W X 12' L X 8' H	STAINLESS STEEL
FEED SOLIDS MODULE SCOUR CENTRIFUGAL CONTRACTORS	PROCESS CELL	1		MODULE 4' W X 8' L X 8' H	STAINLESS STEEL
FEED STAPLER MODULE STEEL CENTRIFUGAL CONTRACTORS	PROCESS CELL	1		MODULE 4' W X 10' L X 8' H	STAINLESS STEEL
FEED SOLVENT WASH MODULE WASH CENTRIFUGAL CONTRACTORS	PROCESS CELL	1		MODULE 12' W X 10' L X 8' H	STAINLESS STEEL
1) SCREEN COLUMN	PROCESS CELL	1		1' D X 6' H	STAINLESS STEEL
1) COLUMN	PROCESS CELL	1	3000 GAL	6' D X 15' H	STAINLESS STEEL
CE CONCENTRATOR	PROCESS CELL	1	10 GPM	15' H	STAINLESS STEEL
CE CONCENTRATION CONDENSER	PROCESS CELL	1		2' D X 6' L	STAINLESS STEEL
W4 SCRAPPER SOLUTION CONCENTRATOR	PROCESS CELL	1	25 GPM	15' H	STAINLESS STEEL
W4 OFF-GAS SCRAPPER W PUBLE CAP TRAYS	PROCESS CELL	1		6' D X 12' H	STAINLESS STEEL
W4 SCRAPPER CONCENTRATOR CONDENSER	PROCESS CELL	1	20 GPM	3' D X 7' H	STAINLESS STEEL
OFF-GAS HEATER	PROCESS CELL	1	1500 SUPH		STAINLESS STEEL
OFF-GAS FILTER	PROCESS CELL	1	1500 SUPH		STAINLESS STEEL
TANK JETS	PROCESS CELL	30			STAINLESS STEEL
SUMP JETS	PROCESS CELL	6	25 GPM		STAINLESS STEEL
TOTAL IN-CELL EQUIPMENT					
SCOUR SOLUTION FEED TANK	IN BLDG/OUT-OF-CELL	1	500 GAL	4' 6" DIA X 3' H	STAINLESS STEEL
SCOUR SOLUTION FEED TANK TRANSFER PUMP A	IN BLDG/OUT-OF-CELL	1			
SCOUR SOLUTION FEED TANK AGITATOR A	IN BLDG/OUT-OF-CELL	1			
STEEL SOLUTION FEED TANK	IN BLDG/OUT-OF-CELL	1	500 GAL	4' 6" DIA X 3' H	STAINLESS STEEL

ITEM	LOCATION	QTY	CAPACITY	DIMENSION	MATERIAL
STRIP SOLUTION FEED TANK TRANSFER PUMP A	IN BLDG/OUT-OF-CELL	1			
STRIP SOLUTION FEED TANK AGITATOR A	IN BLDG/OUT-OF-CELL	1			
WASH SOLUTION FEED TANK	IN BLDG/OUT-OF-CELL	1	500 GAL	4'6"DIA X 5'H	STAINLESS STEEL
WASH SOLUTION FEED TANK TRANSFER PUMP A	IN BLDG/OUT-OF-CELL	1			
WASH SOLUTION FEED TANK AGITATOR A	IN BLDG/OUT-OF-CELL	1			
SOLVENT MAKEUP TANK	IN BLDG/OUT-OF-CELL	1	500 GAL	4'6"DIA X 5'H	STAINLESS STEEL
SOLVENT MAKEUP TANK TRANSFER PUMP A	IN BLDG/OUT-OF-CELL	1			
SOLVENT MAKEUP TANK AGITATOR A	IN BLDG/OUT-OF-CELL	1			
REGENERATION MAKEUP TANK	IN BLDG/OUT-OF-CELL	1	500 GAL	4'6"DIA X 5'H	STAINLESS STEEL
REGENERATION MAKEUP TANK TRANSFER PUMP A	IN BLDG/OUT-OF-CELL	1			
REGENERATION MAKEUP TANK AGITATOR A	IN BLDG/OUT-OF-CELL	1			
0.1N NITRIC ACID ADDITION TANK	IN BLDG/OUT-OF-CELL	1	500 GAL	4'6"DIA X 5'H	STAINLESS STEEL
0.1N NITRIC ACID ADDITION TANK TRANSFER PUMP A	IN BLDG/OUT-OF-CELL	1			
0.1N NITRIC ACID ADDITION TANK AGITATOR A	IN BLDG/OUT-OF-CELL	1			
0.3N NITRIC ACID ADDITION TANK	IN BLDG/OUT-OF-CELL	1	500 GAL	4'6"DIA X 5'H	STAINLESS STEEL
0.3N NITRIC ACID ADDITION TANK TRANSFER PUMP A	IN BLDG/OUT-OF-CELL	1			
0.3N NITRIC ACID ADDITION TANK AGITATOR A	IN BLDG/OUT-OF-CELL	1			
0.5N SODIUM HYDROXIDE ADDITION TANK	IN BLDG/OUT-OF-CELL	1	500 GAL	4'6"DIA X 5'H	STAINLESS STEEL
0.5N SODIUM HYDROXIDE ADDITION TANK - PUMP A	IN BLDG/OUT-OF-CELL	1			
0.5N SODIUM HYDROXIDE ADDITION TANK - AGITATOR A	IN BLDG/OUT-OF-CELL	1			
5.0N SODIUM HYDROXIDE ADDITION TANK	IN BLDG/OUT-OF-CELL	1	500 GAL	4'6"DIA X 5'H	STAINLESS STEEL
5.0N SODIUM HYDROXIDE ADDITION TANK - TRANSFER PUMP A	IN BLDG/OUT-OF-CELL	1			
5.0N SODIUM HYDROXIDE ADDITION TANK - AGITATOR A	IN BLDG/OUT-OF-CELL	1			
PRE-COAT FEED TANK	IN BLDG/OUT-OF-CELL	1	500 GAL	4'6"DIA X 5'H	STAINLESS STEEL

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ITEM	LOCATION	QTY	CAPACITY	DIMENSION	MATERIAL
PRE-SOFT FEED TANK TRANSFER PUMP A	IN BLDG/OUT-OF-CELL	1			
PRE-SOFT FEED TANK AGITATOR A	IN BLDG/OUT-OF-CELL	1			
20% AMMONIUM SULFATE ADDITION TANK AGITATOR A	IN POND/OUT-OF-CELL	1	500 GAL	4'6" DIA X 5' H	STAINLESS STEEL
20% AMMONIUM ACID ADDITION TANK AGITATOR A	IN BLDG/OUT-OF-CELL	1			
20% AMMONIUM ACID ADDITION TANK AGITATOR A	IN BLDG/OUT-OF-CELL	1	500 GAL	4'6" DIA X 5' H	STAINLESS STEEL
PEROXIDE FEED TANK	IN BLDG/OUT-OF-CELL	1			
PEROXIDE FEED TANK TRANSFER PUMP A	IN BLDG/OUT-OF-CELL	1			
PEROXIDE FEED TANK AGITATOR A	IN BLDG/OUT-OF-CELL	1			
SODIUM HYPOCHLORITE SODIUM NITRITE ADDITION TANK	IN BLDG/OUT-OF-CELL	1	500 GAL	4'6" DIA X 5' H	STAINLESS STEEL
SODIUM HYPOCHLORITE SODIUM NITRITE ADDITION TANK-PUMP A	IN BLDG/OUT-OF-CELL	1			
SODIUM HYPOCHLORITE SODIUM NITRITE ADDITION TANK-AGITATOR A	IN BLDG/OUT-OF-CELL	1			
LOW LEVEL WASTE TANK SODIUM NITRITE ADDITION TANK	IN BLDG/OUT-OF-CELL	1	500 GAL	4'6" DIA X 5' H	STAINLESS STEEL
LOW LEVEL WASTE TANK SODIUM NITRITE ADDITION TANK-TRANSFER PUMP A	IN BLDG/OUT-OF-CELL	1			
LOW LEVEL WASTE TANK SODIUM NITRITE ADDITION TANK-AGITATOR A	IN BLDG/OUT-OF-CELL	1			
1% MANGANESE TANK (CE)	IN BLDG/OUT-OF-CELL	1	500 GAL	4'6" DIA X 5' H	STAINLESS STEEL
1% MANGANESE TANK (CS) TRANSFER PUMP A	IN BLDG/OUT-OF-CELL	1			
1% MANGANESE TANK (CS) AGITATOR A	IN BLDG/OUT-OF-CELL	1			
OFF-GAS TREATMENT SODIUM NITRITE TANK	IN BLDG/OUT-OF-CELL	1	500 GAL	4'6" DIA X 5' H	STAINLESS STEEL
OFF-GAS TREATMENT SODIUM NITRITE TANK - TRANSFER PUMP A	IN BLDG/OUT-OF-CELL	1			
OFF-GAS TREATMENT SODIUM NITRITE TANK - AGITATOR A	IN BLDG/OUT-OF-CELL	1			
UTILITY TANK	IN BLDG/OUT-OF-CELL	1	500 GAL	4'6" DIA X 5' H	STAINLESS STEEL
UTILITY TANK TRANSFER PUMP A	IN BLDG/OUT-OF-CELL	1			
UTILITY TANK AGITATOR A	IN BLDG/OUT-OF-CELL	1			
1% MANGANESE TANK	IN BLDG/OUT-OF-CELL	1	500 GAL	4'6" DIA X 5' H	STAINLESS STEEL
1% MANGANESE TANK TRANSFER PUMP A	IN BLDG/OUT-OF-CELL	1			

ITEM	LOCATION	QTY	CAPACITY	DIMENSION	MATERIAL
1) MATERIAL TANK AGITATOR A	IN BLDG/OUT-OF-CELL	1			
ELECTRIC ADDITION TANK	IN BLDG/OUT-OF-CELL	1	500 GAL	4' 6" DIA X 5' H	STAINLESS STEEL
ELECTRIC ADDITION TANK TRANSFER PUMP A	IN BLDG/OUT-OF-CELL	1			
ELECTRIC ADDITION TANK AGITATOR A	IN BLDG/OUT-OF-CELL	1			
TOTAL COLD CHEMICAL IN BLDG					
NITRIC ACID STORAGE TANK	NOT IN BLDG OUT-OF-CELL	4	20000 GAL	15' 0" D X 15' 6" HIGH	STAINLESS STEEL
HYDROCHLORIC ACID STORAGE TANK TRANSFER PUMP A	NOT IN BLDG OUT-OF-CELL	4			
SODIUM HYDROXIDE STORAGE TANK	NOT IN BLDG OUT-OF-CELL	3	20000 GAL	15' 0" D X 15' 6" HIGH	STAINLESS STEEL
SODIUM PHOSPHATE STORAGE TANK TRANSFER PUMP A	NOT IN BLDG OUT-OF-CELL	3			
NITROGEN PEROXIDE STORAGE TANK	NOT IN BLDG OUT-OF-CELL	12	20000 GAL	9' 0" D X 40' LONG	ALUMINUM
NITROGEN PEROXIDE STORAGE TANK TRANSFER PUMP A	NOT IN BLDG OUT-OF-CELL	12			
STEEL SOLUTION MIX TANK	NOT IN BLDG OUT-OF-CELL	1	2000 GAL	7' 0" D X 7' 0" HIGH	STAINLESS STEEL
STEEL SOLUTION MIX TANK	NOT IN BLDG OUT-OF-CELL	1			
STEEL SOLUTION MIX TANK AGITATOR A	NOT IN BLDG OUT-OF-CELL	1	2000 GAL	7' 0" D X 7' 0" HIGH	STAINLESS STEEL
STEEL SOLUTION MIX TANK	NOT IN BLDG OUT-OF-CELL	1			
STEEL SOLUTION MIX TANK TRANSFER PUMP A	NOT IN BLDG OUT-OF-CELL	1			
STEEL SOLUTION MIX TANK	NOT IN BLDG OUT-OF-CELL	1	2000 GAL	7' 0" D X 7' 0" HIGH	STAINLESS STEEL
STEEL SOLUTION MIX TANK TRANSFER PUMP A	NOT IN BLDG OUT-OF-CELL	1			
STEEL SOLUTION MIX TANK	NOT IN BLDG OUT-OF-CELL	1	2000 GAL	7' 0" D X 7' 0" HIGH	STAINLESS STEEL
STEEL SOLUTION MIX TANK TRANSFER PUMP A	NOT IN BLDG OUT-OF-CELL	1			
STEEL SOLUTION MIX TANK	NOT IN BLDG OUT-OF-CELL	1	2000 GAL	7' 0" D X 7' 0" HIGH	STAINLESS STEEL
STEEL SOLUTION MIX TANK TRANSFER PUMP A	NOT IN BLDG OUT-OF-CELL	1			
STEEL SOLUTION MIX TANK	NOT IN BLDG OUT-OF-CELL	1	2000 GAL	7' 0" D X 7' 0" HIGH	STAINLESS STEEL
STEEL SOLUTION MIX TANK TRANSFER PUMP A	NOT IN BLDG OUT-OF-CELL	1			
STEEL SOLUTION MIX TANK	NOT IN BLDG OUT-OF-CELL	1	2000 GAL	7' 0" D X 7' 0" HIGH	STAINLESS STEEL
STEEL SOLUTION MIX TANK TRANSFER PUMP A	NOT IN BLDG OUT-OF-CELL	1			

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ITEM	LOCATION	QTY	CAPACITY	DIMENSION	MATERIAL
ORG MIX TANK	NOT IN BLDG OUT-OF-CELL	1	500 GAL	4' 6" D X 5' 0" HIGH	STAINLESS STEEL
ORG MIX TANK TRANSFER PUMP A	NOT IN BLDG OUT-OF-CELL	1			
ORG MIX TANK AGITATOR A	NOT IN BLDG OUT-OF-CELL	1			
SOLVENT MIX TANK	NOT IN BLDG OUT-OF-CELL	1	500 GAL	4' 6" D X 5' 0" HIGH	STAINLESS STEEL
SOLVENT MIX TANK TRANSFER PUMP A	NOT IN BLDG OUT-OF-CELL	1			
SOLVENT MIX TANK AGITATOR A	NOT IN BLDG OUT-OF-CELL	1			
NITRIC ACID DILUTION TANK	NOT IN BLDG OUT-OF-CELL	1	500 GAL	4' 6" D X 5' 0" HIGH	STAINLESS STEEL
NITRIC ACID DILUTION TANK TRANSFER PUMP A	NOT IN BLDG OUT-OF-CELL	1			
NITRIC ACID DILUTION TANK AGITATOR A	NOT IN BLDG OUT-OF-CELL	1			
SODIUM HYDROXIDE DILUTION TANK	NOT IN BLDG OUT-OF-CELL	2	500 GAL	4' 6" D X 5' 0" HIGH	STAINLESS STEEL
SODIUM HYDROXIDE DILUTION TANK TRANSFER PUMP A	NOT IN BLDG OUT-OF-CELL	2			
SODIUM HYDROXIDE DILUTION TANK AGITATOR A	NOT IN BLDG OUT-OF-CELL	1	500 GAL	4' 6" D X 5' 0" HIGH	STAINLESS STEEL
SODIUM NITRATE MIX TANK	NOT IN BLDG OUT-OF-CELL	1			
SODIUM NITRATE MIX TANK TRANSFER PUMP A	NOT IN BLDG OUT-OF-CELL	1			
SODIUM NITRATE MIX TANK AGITATOR A	NOT IN BLDG OUT-OF-CELL	1	500 GAL	4' 6" D X 5' 0" HIGH	STAINLESS STEEL
PREDICT MIX TANK	NOT IN BLDG OUT-OF-CELL	1			
PREDICT MIX TANK TRANSFER PUMP A	NOT IN BLDG OUT-OF-CELL	1			
PREDICT MIX TANK AGITATOR A	NOT IN BLDG OUT-OF-CELL	1			
TOTAL COLL CHEMICAL OUT OF BLDG					
REG MAINTENANCE EQUIPMENT	REG MAINT SHED	101			
NON-REG MAINTENANCE EQUIPMENT	NON-REG SHED	101			
MSW REPAIR EQUIPMENT	MSW REPAIR	101			
TOTAL REGULATED, NON-REGULATED & MSW REPAIR					

ITEM	LOCATION	QTY	CAPACITY	DIMENSION	MATERIAL
PNEUMATIC TRANSFER SYSTEM	ANALYTICAL CELLS	4		2'	STAINLESS STEEL
DECON BLOW BOT	MSW REPAIR	1			STAINLESS STEEL
CR. DECON EQUIP-MEN		LOT			

TOTAL EQUIPMENT DECON REPAIR & MAINTENANCE

TRANSFER DRUMS	SAMPLE/ANALYT ROOM	4		2' x 2' x 2'	STAINLESS STEEL
SAMPLE MONITOR	SAMPLE CELLS	35	15 ML		STAINLESS STEEL

TOTAL PROCESS SAMPLING

HOT LAB EQUIPMENT	HOT LAB	LOT			STAINLESS STEEL
COLD LAB EQUIPMENT	COLD LAB	LOT			

TOTAL ANALYTICAL FACILITIES

CRANE	CANYON CUT-UP CELL	1	30 TON	7.5' x 11' x 20'	CARBON STEEL
50" SHIELD WINDOWS	RECIP. REMOTE CELLS	6			LEAD GLASS
22" SHIELD WINDOWS	SAMPLE REMOTE CELLS	10			LEAD GLASS
MASTER SLAVE MANIPULATORS	VARIOUS REMOTE CELLS	32	MODEL F		STAINLESS STEEL
ELECT MECH MANIPULATORS	REMOTE MAIN CELLS	3	TEAF 3000		STAINLESS STEEL
PSM LIFTS	PSM REPAIR	3	SINGLE		CARBON STEEL
SHIELD WINDOW CAST	PAINT AREA	1			CARBON STEEL
CRMC CRANE	CRMC	1	7.5 TON		CARBON STEEL
CRMC SHIELD DOOR/HOLE	CRMC				STAINLESS STEEL
CRANE BLOCKS, TONES, & RAILS	CANYON	LOT	30 TON		STAINLESS STEEL
CUT-UP ROOM EQUIPMENT	CUT-UP ROOM	LOT			
FECA REMOTE LIGHTS	FECA	4			STAINLESS STEEL

TOTAL REMOTE HANDLING EQUIPMENT

TOTAL GRAND, ALL EQUIPMENT

APPENDIX B

EQUIPMENT LIST INTEGRATED FACILITY

ITEM	LOCATION	QTY	CAPACITY	DIMENSION	MATERIAL
DISSOLVER A	PROCESS CELL	1	42000 GAL	15' WIDE X 15.5' HIGH X 27' LONG	HASTELLOY C-276
DISSOLVER A TRANSFER PUMP A	PROCESS CELL	1			HASTELLOY C-276
DISSOLVER A TRANSFER PUMP B	PROCESS CELL	1			HASTELLOY C-276
DISSOLVER A AGITATOR A	PROCESS CELL	1			HASTELLOY C-276
DISSOLVER A AGITATOR B	PROCESS CELL	1			HASTELLOY C-276
DISSOLVER A SAMPLE PUMP A	PROCESS CELL	1			HASTELLOY C-276
DISSOLVER A	PROCESS CELL	1	10 GPM	MODULE 15' WIDE X 15' HIGH X 20' LONG	STAINLESS STEEL
DISSOLVER B	PROCESS CELL	1			SST 304L
DISSOLVER B TRANSFER PUMP A	PROCESS CELL	1			SST 304L
DISSOLVER B TRANSFER PUMP B	PROCESS CELL	1			SST 304L
DISSOLVER B AGITATOR A	PROCESS CELL	1			SST 304L
DISSOLVER B AGITATOR B	PROCESS CELL	1			SST 304L
DISSOLVER B SAMPLE PUMP A	PROCESS CELL	1			SST 304L
DISSOLVER B	PROCESS CELL	1	25000 GAL	15' WIDE X 15.5' HIGH X 20' LONG	SST 304L
DISSOLVER B	PROCESS CELL	1	10 GPM	MODULE 15' WIDE X 15' HIGH X 20' LONG	STAINLESS STEEL
DISSOLVER B TRANSFER PUMP A	PROCESS CELL	1			HASTELLOY C-276
DISSOLVER B TRANSFER PUMP B	PROCESS CELL	1			HASTELLOY C-276
DISSOLVER B AGITATOR A	PROCESS CELL	1			HASTELLOY C-276
DISSOLVER B AGITATOR B	PROCESS CELL	1			HASTELLOY C-276
DISSOLVER B SAMPLE PUMP A	PROCESS CELL	1			HASTELLOY C-276
DISSOLVER B	PROCESS CELL	1	42000 GAL	15' WIDE X 15.5' HIGH X 27' LONG	HASTELLOY C-276
DISSOLVER B	PROCESS CELL	1			SST 304L
DISSOLVER B TRANSFER PUMP A	PROCESS CELL	1			SST 304L
DISSOLVER B TRANSFER PUMP B	PROCESS CELL	1			SST 304L
DISSOLVER B AGITATOR A	PROCESS CELL	1			SST 304L
DISSOLVER B AGITATOR B	PROCESS CELL	1			SST 304L
DISSOLVER B SAMPLE PUMP A	PROCESS CELL	1			SST 304L
DISSOLVER B	PROCESS CELL	1			SST 304L

ITEM	LOCATION	QTY	CAPACITY	DIMENSION	MATERIAL
NO. 1 TOWERS & 4 D X 20 H, W' BUBBLE CAP TRAYS	PROCESS CELL	2		NO. 15' WIDE X 15' HIGH X 20' LONG	STAINLESS STEEL
NO. 1 TOWERS TRANSFER PUMP A	PROCESS CELL	1			
NO. 1 TOWERS PUMP B	PROCESS CELL	1			
RECOVERED NITRIC TAN	PROCESS CELL	1	32000 GAL	15' WIDE X 15.5' HIGH X 27' LONG	STAINLESS STEEL
RECOVERED NITRIC TAN TRANSFER PUMP A	PROCESS CELL	1			
RECOVERED NITRIC TAN AGITATOR A	PROCESS CELL	1			
RECOVERED NITRIC TAN AGITATOR B	PROCESS CELL	1			
SUPERPHATE FEED/RECEIVER A	PROCESS CELL	1	26000 GAL	15' WIDE X 15.5' HIGH X 20' LONG	STAINLESS STEEL
SUPERPHATE FEED/RECEIVER A TRANSFER PUMP A	PROCESS CELL	1			
SUPERPHATE FEED/RECEIVER A AGITATOR A	PROCESS CELL	1			
SUPERPHATE FEED/RECEIVER A AGITATOR B	PROCESS CELL	1			
SUPERPHATE FEED/RECEIVER B	PROCESS CELL	1	26000 GAL	15' WIDE X 15.5' HIGH X 20' LONG	STAINLESS STEEL
SUPERPHATE FEED/RECEIVER B TRANSFER PUMP A	PROCESS CELL	1			
SUPERPHATE FEED/RECEIVER B AGITATOR A	PROCESS CELL	1			
SUPERPHATE FEED/RECEIVER B AGITATOR B	PROCESS CELL	1			
LOW LEVEL WASTE TAN A	PROCESS CELL	1	40000 GAL	15' WIDE X 15.5' HIGH X 27' LONG	STAINLESS STEEL
LOW LEVEL WASTE TAN A TRANSFER PUMP A	PROCESS CELL	1			
LOW LEVEL WASTE TAN A AGITATOR A	PROCESS CELL	1			
LOW LEVEL WASTE TAN A AGITATOR B	PROCESS CELL	1			
LOW LEVEL WASTE TAN B	PROCESS CELL	1	40000 GAL	15' WIDE X 15.5' HIGH X 27' LONG	STAINLESS STEEL
LOW LEVEL WASTE TAN B TRANSFER PUMP A	PROCESS CELL	1			
LOW LEVEL WASTE TAN B AGITATOR A	PROCESS CELL	1			
LOW LEVEL WASTE TAN B AGITATOR B	PROCESS CELL	1			

ITEM	LOCATION	QTY	CAPACITY	DIMENSION	MATERIAL
CE PRODUCT STORAGE	PROCESS CELL	1	5000 GAL		STAINLESS STEEL
CE PRODUCT STORAGE TRANSFER PUMP A	PROCESS CELL	1			
CE PRODUCT STORAGE AGITATOR A	PROCESS CELL	1			
CE PROD RECEIVER	PROCESS CELL		1000 GAL		STAINLESS STEEL
CE PROD RECVR COOLING COIL	PROCESS CELL	1			
CE PROD RECEIVER TRANSFER PUMP A	PROCESS CELL	1			
CE PROD RECEIVER AGITATOR A	PROCESS CELL	1			
CE PROD RECEIVER	PROCESS CELL	1	14000 GAL	13.5 DIA X 13.5 HIGH	STAINLESS STEEL
CE PROD RECEIVER COOLING COIL	PROCESS CELL	1			
CE PROD RECEIVER TRANSFER PUMP A	PROCESS CELL	1			
CE ELUANT RECICLE	PROCESS CELL	1	14000 GAL	13.5 DIA X 13.5 HIGH	STAINLESS STEEL
CE ELUANT RECICLE COOLING COIL	PROCESS CELL	1			
CE ELUANT RECICLE TRANSFER PUMP A	PROCESS CELL	1			
CE ELUANT RECICLE AGITATOR A	PROCESS CELL	1			
CE PUMP TANK	PROCESS CELL	1	1000 GAL		STAINLESS STEEL
CE PUMP TANK COOLING COIL	PROCESS CELL	1			
CE PUMP TANK TRANSFER PUMP A	PROCESS CELL	1			
CE PUMP TANK AGITATOR A	PROCESS CELL	1			
CE WASTE RECEIVER	PROCESS CELL		2000 GAL		STAINLESS STEEL
CE WASTE RECEIVER COOLING COIL	PROCESS CELL				
CE WASTE RECEIVER TRANSFER PUMP A	PROCESS CELL	1			
CE WASTE RECEIVER AGITATOR A	PROCESS CELL	1			
CE FEED STORAGE	PROCESS CELL	1	14000 GAL	13.5 DIA X 13.5 HIGH	STAINLESS STEEL
CE FEED STORAGE COOLING COIL	PROCESS CELL	1			
CE FEED STORAGE TRANSFER PUMP A	PROCESS CELL	1			
CE FEED STORAGE AGITATOR A	PROCESS CELL	1			
CE PUMP COLLECTION TANK	PROCESS CELL	1	5000 GAL	10 DIA X 10 HIGH	STAINLESS STEEL
CE PUMP COLLECTION TANK TRANSFER PUMP A	PROCESS CELL	1			

ITEM	LOCATION	QTY	CAPACITY	DIMENSION	MATERIAL
SOLVENT COLLECTION TANK AGITATOR A	PROCESS CELL	1			
WASTE OFFGAS SOLVENTS RECIP TANK	PROCESS CELL	1	4000 GAL	10'0 X 7'6	STAINLESS STEEL
WMT OFFGAS SCRUBB RCV T1 CL COIL					
WMT OFFGAS SCRUBB RECIP TANK TRANSFER PUMP A	PROCESS CELL	1			
WMT OFFGAS SCRUBBER FEED TANK AGITATOR A	PROCESS CELL	1			
FEED WMT OF TANK	PROCESS CELL	1	6000 GAL	10'0 DIA X 14 HIGH	STAINLESS STEEL
FEED WMT OF TANK COOLING COIL					
FEED WMT OF TANK TRANSFER PUMP B	PROCESS CELL	1			
FEED WMT OF TANK AGITATOR A	PROCESS CELL	1			
FEED PUMP TANK	PROCESS CELL	1	9000 GAL	10'0 DIA X 14 HIGH	STAINLESS STEEL
FEED PUMP TANK COOLING COIL					
FEED TANK TANK FEED PUMP A	PROCESS CELL	1			
FEED PUMP TANK AGITATOR A	PROCESS CELL	1			
WASTE RECEIVER TANK	PROCESS CELL	1	8000 GAL	10'0 DIA X 14 HIGH	STAINLESS STEEL
WASTE RECEIVER TANK COOLING COIL					
WASTE RECEIVER TANK TRANSFER PUMP A	PROCESS CELL	1			
WASTE RECEIVER TANK AGITATOR A	PROCESS CELL	1			
SOLVENT FEED TANK	PROCESS CELL	1	4000 GAL	8'0 DIA X 10'0 HIGH	STAINLESS STEEL
SOLVENT FEED TANK COOLING COIL					
SOLVENT FEED TANK FEED PUMP A	PROCESS CELL	1			
SOLVENT FEED TANK AGITATOR A	PROCESS CELL	1			
SOLVENT WASH WASTE TANK	PROCESS CELL	1	4000 GAL	8'0 DIA X 10'0 HIGH	STAINLESS STEEL
SOLVENT WASH WST T1 COOLING COIL					
SOLVENT WASH WASTE TANK FEED PUMP A	PROCESS CELL	1			
SOLVENT WASH WASTE TANK AGITATOR A	PROCESS CELL	1			
SOLVENT STORAGE TANK	PROCESS CELL	1	4000 GAL	8'0 DIA X 10'0 HIGH	STAINLESS STEEL
SOLVENT STORAGE T1 COOLING COIL					
SOLVENT STORAGE TANK	PROCESS CELL	1			
SOLVENT STORAGE TANK TRANSFER PUMP A	PROCESS CELL	1			
SOLVENT STORAGE TANK AGITATOR A	PROCESS CELL	1			

ITEM	LOCATION	QTY	CAPACITY	DIMENSION	MATERIAL
INH. SCRUBBER CONDENSATE RECYF	PROCESS CELL	1	4000 GAL	10 D X 7 H	STAINLESS STEEL
INH. SCRUB. CONDST. REC. COOL. COIL					
INH. SCRUBBER CONDENSATE RECYF TRAP/SEEP PUMP A	PROCESS CELL	1			
INH. SCRUBBER CONDENSATE RECYF UNIT OF A	PROCESS CELL	1			
TRAP/EXT. DETECTION MODULE EFFECTIC. CENTRIFUGAL CONTACTORS	PROCESS CELL	1		MODULE 4 W X 12 L X 8 H	STAINLESS STEEL
TRAP/STAGE MODULE SCRUB. CENTRIFUGAL CONTACTORS	PROCESS CELL	1		MODULE 4 W X 8 L X 8 H	STAINLESS STEEL
TRAP/STAGE MODULE STRIP CENTRIFUGAL CONTACTORS	PROCESS CELL	1		MODULE 4 W X 10 L X 8 H	STAINLESS STEEL
TRAP/STAGE MODULE WASH CENTRIFUGAL CONTACTORS	PROCESS CELL	1		MODULE 2 W X 10 L X 8 H	STAINLESS STEEL
13. SOLOVENT COLUMN	PROCESS CELL	1		16 D X 6 H	STAINLESS STEEL
14. COLUMN	PROCESS CELL	1	3000 GAL	6 D X 18 H	STAINLESS STEEL
15. CONCENTRATOR	PROCESS CELL	1	10 GPM	15 H	STAINLESS STEEL
16. CONCENTRATOR CONDENSER	PROCESS CELL	1		2 D X 6 L	STAINLESS STEEL
INH. END-SEEP SEEDITION CONDENSATION	PROCESS CELL	1	20 GPM	15 H	STAINLESS STEEL
INH. OFF-GAS SCRUBBER W. BUBBLE CAP TRAP'S	PROCESS CELL	1		3 D X 12 H	STAINLESS STEEL
INH. SCRUBBER CONDENSATION CONDENSER	PROCESS CELL	1	20 GPM	3 D X 7 H	STAINLESS STEEL
OFF-GAS HEATERS	PROCESS CELL	1	1500 GPM		STAINLESS STEEL
OFF-GAS FILTER	PROCESS CELL	1	1500 GPM		STAINLESS STEEL
TANK DETS	PROCESS CELL	30			STAINLESS STEEL
SUMP DETS	PROCESS CELL	6	25 GPM		STAINLESS STEEL
TOTAL IN-CELL EQUIPMENT					
SCRUB SOLUTION FEED TANK	IN KIDS/OUT-OF-CELL	1	500 GAL	4 6" DIA X 5 H	STAINLESS STEEL
SCRUB SOLUTION FEED TANK TRANSFER PUMP A	IN KIDS/OUT-OF-CELL	1			
SCRUB SOLUTION FEED TANK ADDITION A	IN KIDS/OUT-OF-CELL	1	"		
SCRUB SOLUTION FEED TANK	IN KIDS OUT-OF-CELL	1	500 GAL	4 6" DIA X 5 H	STAINLESS STEEL

ITEM	LOCATION	QTY	CAPACITY	DIMENSION	MATERIAL
STRIP SOLUTION FEED TANK TRANSFER PUMP A	IN BLDG OUT-OF-CELL	1			
STRIP SOLUTION FEED TANK AGITATOR A	IN BLDG OUT-OF-CELL	1			
WASH SOLUTION FEED TANK	IN BLDG OUT-OF-CELL	1	500 GAL	4'6" DIA X 5' H	STAINLESS STEEL
WASH SOLUTION FEED TANK TRANSFER PUMP A	IN BLDG OUT-OF-CELL	1			
WASH SOLUTION FEED TANK AGITATOR A	IN BLDG OUT-OF-CELL	1			
SOLVENT WASHES TANK	IN BLDG OUT-OF-CELL	1	500 GAL	4'6" DIA X 5' H	STAINLESS STEEL
COARSE WASTE TANK TRANSFER PUMP A	IN BLDG OUT-OF-CELL	1			
SOLVENT WASTE TANK AGITATOR A	IN BLDG OUT-OF-CELL	1			
11 REGENERATION WASTE TANK	IN BLDG OUT-OF-CELL	1	500 GAL	4'6" DIA X 5' H	STAINLESS STEEL
11 REGENERATION WASTE TANK AGITATOR A	IN BLDG OUT-OF-CELL	1			
11 REGENERATION WASTE TANK PUMP A	IN BLDG OUT-OF-CELL	1			
0.1M NITRIC ACID ADDITION TANK	IN BLDG OUT-OF-CELL	1	500 GAL	4'6" DIA X 5' H	STAINLESS STEEL
0.1M NITRIC ACID ADDITION TANK TRANSFER PUMP A	IN BLDG OUT-OF-CELL	1			
0.1M NITRIC ACID ADDITION TANK AGITATOR A	IN BLDG OUT-OF-CELL	1			
0.3M NITRIC ACID ADDITION TANK	IN BLDG OUT-OF-CELL	1	500 GAL	4'6" DIA X 5' H	STAINLESS STEEL
0.3M NITRIC ACID ADDITION TANK TRANSFER PUMP A	IN BLDG OUT-OF-CELL	1			
0.3M NITRIC ACID ADDITION TANK AGITATOR A	IN BLDG OUT-OF-CELL	1			
0.5M SODIUM HYDROXIDE ADDITION TANK	IN BLDG OUT-OF-CELL	1	500 GAL	4'6" DIA X 5' H	STAINLESS STEEL
0.5M SODIUM HYDROXIDE ADDITION TANK - PUMP A	IN BLDG OUT-OF-CELL	1			
0.5M SODIUM HYDROXIDE ADDITION TANK - AGITATOR A	IN BLDG OUT-OF-CELL	1			
0.5M SODIUM HYDROXIDE ADDITION TANK	IN BLDG OUT-OF-CELL	1	500 GAL	4'6" DIA X 5' H	STAINLESS STEEL
0.5M SODIUM HYDROXIDE ADDITION TANK - TRANSFER PUMP A	IN BLDG OUT-OF-CELL	1			
0.5M SODIUM HYDROXIDE ADDITION TANK - AGITATOR A	IN BLDG OUT-OF-CELL	1			
0.5M SODIUM HYDROXIDE ADDITION TANK	IN BLDG OUT-OF-CELL	1	500 GAL	4'6" DIA X 5' H	STAINLESS STEEL
0.5M SODIUM HYDROXIDE ADDITION TANK - AGITATOR A	IN BLDG OUT-OF-CELL	1			
0.5M SODIUM HYDROXIDE ADDITION TANK	IN BLDG OUT-OF-CELL	1	500 GAL	4'6" DIA X 5' H	STAINLESS STEEL

ITEM	LOCATION	QTY	CAPACITY	DIMENSION	MATERIAL
PRE-2001 FEED TAN TRANSFER PUMP A	IN BLDG/OUT-OF-CELL	1			
PRE-2001 FEED TAN AGITATOR A	IN BLDG/OUT-OF-CELL	1			
100 NITRIC ACID ADDITION TAN	IN BLDG/OUT-OF-CELL	1	500 GAL	4'6" DIA X 5'H	STAINLESS STEEL
100 NITRIC ACID ADDITION TAN TRANSFER PUMP A	IN BLDG/OUT-OF-CELL	1			
100 NITRIC ACID ADDITION TAN AGITATOR A	IN BLDG/OUT-OF-CELL	1			
PEROXIDE FEED TAN	IN BLDG/OUT-OF-CELL	1	500 GAL	4'6" DIA X 5'H	STAINLESS STEEL
PEROXIDE FEED TAN TRANSFER PUMP A	IN BLDG/OUT-OF-CELL	1			
PEROXIDE FEED TAN AGITATOR A	IN BLDG/OUT-OF-CELL	1			
SULFUR RECEIVER SECTION NITRATE ADDITION TAN	IN BLDG/OUT-OF-CELL	1	500 GAL	4'6" DIA X 5'H	STAINLESS STEEL
SULFUR RECEIVER SECTION NITRATE ADDITION TAN-PUMP A	IN BLDG/OUT-OF-CELL	1			
SULFUR RECEIVER SECTION NITRATE ADDITION TAN-PUMP A	IN BLDG/OUT-OF-CELL	1			
LOW LEVEL WASTE TAN SECTION NITRATE ADDITION TAN-PUMP A	IN BLDG/OUT-OF-CELL	1			
LOW LEVEL WASTE TAN SECTION NITRATE ADDITION TAN	IN BLDG/OUT-OF-CELL	1	500 GAL	4'6" DIA X 5'H	STAINLESS STEEL
LOW LEVEL WASTE TAN SECTION NITRATE ADDITION TAN-PUMP A	IN BLDG/OUT-OF-CELL	1			
LOW LEVEL WASTE TAN SECTION NITRATE ADDITION TAN-PUMP A	IN BLDG/OUT-OF-CELL	1			
OFF-603 TREATMENT SECTION NITRATE TAN	IN BLDG/OUT-OF-CELL	1	500 GAL	4'6" DIA X 5'H	STAINLESS STEEL
OFF-603 TREATMENT SECTION NITRATE TAN	IN BLDG/OUT-OF-CELL	1			
OFF-603 TREATMENT SECTION NITRATE TAN - PUMP A	IN BLDG/OUT-OF-CELL	1			
OFF-603 TREATMENT SECTION NITRATE TAN - AGITATOR A	IN BLDG/OUT-OF-CELL	1			
UTILITY TAN	IN BLDG/OUT-OF-CELL	1	500 GAL	4'6" DIA X 5'H	STAINLESS STEEL
UTILITY TAN TRANSFER PUMP A	IN BLDG/OUT-OF-CELL	1			
UTILITY TAN AGITATOR A	IN BLDG/OUT-OF-CELL	1			
IX MAKEUP TAN	IN BLDG/OUT-OF-CELL	1	500 GAL	4'6" DIA X 5'H	STAINLESS STEEL
IX MAKEUP TAN TRANSFER PUMP A	IN BLDG/OUT-OF-CELL	1			

ITEM	LOCATION	QTY	CAPACITY	DIMENSION	MATERIAL
CMPD M1) TANK TRANSFER PUMP A	HOT IN BLDG/ OUT-OF-CELL	1	500 GAL	4' 6" X 5' 0"	STAINLESS STEEL
FREC M1) TANK AGITATOR A	HOT IN BLDG/ OUT-OF-CELL	1			
SOLVENT M1) TANK TRANSFER PUMP A	HOT IN BLDG/ OUT-OF-CELL	1	500 GAL	4' 6" X 5' 0"	STAINLESS STEEL
SOLVENT M1) TANK AGITATOR A	HOT IN BLDG/ OUT-OF-CELL	1			
MIXED ACID DILUTION TANK TRANSFER PUMP A	HOT IN BLDG/ OUT-OF-CELL	3	500 GAL	4' 6" X 5' 0"	STAINLESS STEEL
NITRIC ACID DILUTION TANK TRANSFER PUMP A	HOT IN BLDG/ OUT-OF-CELL	3			
NITRIC ACID DILUTION TANK AGITATOR A	HOT IN BLDG/ OUT-OF-CELL	3			
SECTION HYDROLYTE DILUTION TANK	HOT IN ELDS/ OUT-OF-CELL	2	500 GAL	4' 6" X 5' 0"	STAINLESS STEEL
SOLITE P-LISOLITE DILUTION TANK TRANSFER PUMP A	HOT IN BLDG/ OUT-OF-CELL	2			
SOLITE PHOSPHORIC DILUTION TANK AGITATOR A	HOT IN BLDG/ OUT-OF-CELL	2			
SOLITE NITRATE HOT TANK	HOT IN ELDS/ OUT-OF-CELL	1	500 GAL	4' 6" X 5' 0"	STAINLESS STEEL
SOLITE NITRATE HOT TANK TRANSFER PUMP A	HOT IN BLDG/ OUT-OF-CELL	1			
SOLITE NITRITE HOT TANK AGITATOR A	HOT IN BLDG/ OUT-OF-CELL	1			
PREDIGEST M1) TANK TRANSFER PUMP A	HOT IN BLDG/ OUT-OF-CELL	1			
PREDIGEST M1) TANK AGITATOR A	HOT IN BLDG/ OUT-OF-CELL	1	500 GAL	4' 6" X 5' 0"	STAINLESS STEEL
TOTAL COLD CHEMICAL OUT OF BLDG					
REG MAINTENANCE EQUIPMENT	REG MAINT SHOP	LOT			
NON-REG MAINTENANCE EQUIPMENT	NON-REG SHOP	LOT			
MSR REPAIR EQUIPMENT	MSR REPAIR	LOT			
TOTAL REGULATED, NON-REGULATED & MSR REPAIR					

ITEM	LOCATION	QTY	CAPACITY	DIMENSION	MATERIAL
PNEUMATIC TRANSFER SYSTEM	ANALYTICAL CELLS	4		2"	STAINLESS STEEL
TOTAL PNEUMATIC TRANSFER SYSTEM					
TRANSFER DEVICES	SAMPLE HANDLING ROOM	4		2' X 2' X 2'	STAINLESS STEEL
SAMPLE RACKS	SAMPLE CELLS	35	15 ML		STAINLESS STEEL
TOTAL PROCESS SAMPLING					
HOT LAP EQUIPMENT	HOT LAP	LOT			STAINLESS STEEL
COLD LAP EQUIPMENT	COLD LAP	LOT			
TOTAL ANALYTICAL FACILITIES					
CRANE	CANTON OUT-OF-CELL	1	30 TON	75' X 11' X 20'	CARBON STEEL
50" SHELL WINDOWS	MAINT. REMOTE CELLS	6			LEAD GLASS
22" SHELL WINDOWS	SAMPLE REMOTE CELLS	10			LEAD GLASS
MASTER SLAVE MANIPULATORS	VARIOUS REMOTE CELLS	32	MODEL F		STAINLESS STEEL
ELECT MECH MANIPULATOR	REMOTE MAIN CELLS	3	FAR 3000		STAINLESS STEEL
NEW CARTS	MSK REPAIR	3	SINGLE		CARBON STEEL
5" SHELL WINDOW CART	MAINT AREA	1			CARBON STEEL
CRANE CRANE	CRCL	1	7.5 TON		CARBON STEEL
CRANE BLOCKS, YOLLS, & BAILS	CANTON	LOT	30 TON		STAINLESS STEEL
CUT-UP ROOM EQUIPMENT	CUT-UP ROOM	LOT			
FELCH REMOTE LIGHTS	FELCH	4			STAINLESS STEEL
TOTAL REMOTE HANDLING EQUIPMENT					
TOTAL GRAND, ALL EQUIPMENT					

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ITEM	LOCATION	QTY	CAPACITY	DIMENSION	MATERIAL
JURFERS	PROCESS CELL	710		2"	STAINLESS STEEL
EMBEDDED PIPE TO SULLER	CELL WALLS	600		2"	STAINLESS STEEL
REMOVE IN-CELL PIPE ROOT LINES CELL WALLS		90		2"	STAINLESS STEEL

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APPENDIX C

EQUIPMENT LIST CO-LOCATED FACILITY

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ITEM	LOCATION	QTY	CAPACITY	DIMENSION	MATERIAL
DISSOLVER A	PROCESS CELL	1	42000 GAL	15' WIDE X 15.5' HIGH X 27' LONG	HASTELLOY C-276
DISSOLVER A TRANSFER PUMP A	PROCESS CELL	1			HASTELLOY C-276
DISSOLVER A TRANSFER PUMP B	PROCESS CELL	1			HASTELLOY C-276
DISSOLVER A AGITATOR A	PROCESS CELL	1			HASTELLOY C-276
DISSOLVER A AGITATOR B	PROCESS CELL	1			HASTELLOY C-276
DISSOLVER A SAMPLE PUMP A	PROCESS CELL	1			HASTELLOY C-276
DISSOLVER A CONDENSER/DE-ENTRAINER	PROCESS CELL	1	10 GPM	MODULE 15' WIDE X 15' HIGH X 20' LONG	STAINLESS STEEL
SLUDGE RECEIVER A	PROCESS CELL	1	29000 GAL	15' WIDE X 15.5' HIGH X 20' LONG	SST 304L
SLUDGE RECEIVER A TRANSFER PUMP A	PROCESS CELL	1			SST 304L
SLUDGE RECEIVER A SAMPLE PUMP A	PROCESS CELL	1			SST 304L
SLUDGE RECEIVER A AGITATOR A	PROCESS CELL	1			SST 304L
SLUDGE RECEIVER A AGITATOR B	PROCESS CELL	1			SST 304L
DISSOLVER B	PROCESS CELL	1	42000 GAL	15' WIDE X 15.5' HIGH X 27' LONG	HASTELLOY C-276
DISSOLVER B TRANSFER PUMP A	PROCESS CELL	1			HASTELLOY C-276
DISSOLVER B TRANSFER PUMP B	PROCESS CELL	1			HASTELLOY C-276
DISSOLVER B AGITATOR A	PROCESS CELL	1			HASTELLOY C-276
DISSOLVER B AGITATOR B	PROCESS CELL	1			HASTELLOY C-276
DISSOLVER B SAMPLE PUMP A	PROCESS CELL	1			HASTELLOY C-276
DISSOLVER B CONDENSER/DE-ENTRAINER	PROCESS CELL	1	10 GPM	MODULE 15' WIDE X 15' HIGH X 20' LONG	STAINLESS STEEL
SLUDGE RECEIVER B	PROCESS CELL	1	29000 GAL	15' WIDE X 15.5' HIGH X 20' LONG	SST 304L
SLUDGE RECEIVER B TRANSFER PUMP A	PROCESS CELL	1			SST 304L
SLUDGE RECEIVER B AGITATOR A	PROCESS CELL	1			SST 304L
SLUDGE RECEIVER B AGITATOR B	PROCESS CELL	1			SST 304L
SLUDGE RECEIVER B SAMPLE PUMP A	PROCESS CELL	1			SST 304L

ITEM	LOCATION	QTY	CAPACITY	DIMENSION	MATERIAL
NO. 100000 (2 TONERS & 4 D X 20" H. W/ BUBBLE CAP TRAYS)	PROCESS CELL	2		MODULE 15" WIDE X 15" HIGH X 20" LONG	STAINLESS STEEL
NO. 100000 TRANSFER PUMP A	PROCESS CELL	1			
NO. 100000 PUMP B	PROCESS CELL	1			
RECOVERED NITRIC TANK	PROCESS CELL	1	32000 GAL	15" WIDE X 15.5" HIGH X 22" LONG	STAINLESS STEEL
RECOVERED NITRIC TANK TRANSFER PUMP A	PROCESS CELL	1			
RECOVERED NITRIC TANK AGITATOR A	PROCESS CELL	1			
RECOVERED NITRIC TANK AGITATOR B	PROCESS CELL	1			
SUPERMATE FEED/RECEIVER A	PROCESS CELL	1	28000 GAL	15" WIDE X 15.5" HIGH X 20" LONG	STAINLESS STEEL
SUPERMATE FEED/RECEIVER A TRANSFER PUMP A	PROCESS CELL	1			
SUPERMATE FEED/RECEIVER A AGITATOR A	PROCESS CELL	1			
SUPERMATE FEED/RECEIVER A AGITATOR B	PROCESS CELL	1			
SUPERMATE FEED/RECEIVER B	PROCESS CELL	1	28000 GAL	15" WIDE X 15.5" HIGH X 20" LONG	STAINLESS STEEL
SUPERMATE FEED/RECEIVER B TRANSFER PUMP A	PROCESS CELL	1			
SUPERMATE FEED/RECEIVER B AGITATOR A	PROCESS CELL	1			
SUPERMATE FEED/RECEIVER B AGITATOR B	PROCESS CELL	1			
LOW LEVEL WASTE TANK A	PROCESS CELL	1	40000 GAL	15" WIDE X 15.5" HIGH X 27" LONG	STAINLESS STEEL
LOW LEVEL WASTE TANK A TRANSFER PUMP A	PROCESS CELL	1			
LOW LEVEL WASTE TANK A AGITATOR A	PROCESS CELL	1			
LOW LEVEL WASTE TANK A AGITATOR B	PROCESS CELL	1			
LOW LEVEL WASTE TANK B	PROCESS CELL	1	40000 GAL	15" WIDE X 15.5" HIGH X 27" LONG	STAINLESS STEEL
LOW LEVEL WASTE TANK B TRANSFER PUMP A	PROCESS CELL	1			
LOW LEVEL WASTE TANK B AGITATOR A	PROCESS CELL	1			
LOW LEVEL WASTE TANK B AGITATOR B	PROCESS CELL	1			

ITEM	LOCATION	QTY	CAPACITY	DIMENSION	MATERIAL
CE PRODUCT STORAGE	PROCESS CELL	1	5000 GAL		STAINLESS STEEL
CE PRODUCT STORAGE TRANSFER PUMP A	PROCESS CELL	1			
CE PRODUCT STORAGE AGITATOR A	PROCESS CELL	1			
CE PROD RECEIVER	PROCESS CELL		1000 GAL		STAINLESS STEEL
CE PROD RECVR COOLING COIL	PROCESS CELL	1			
CE PROD RECEIVER TRANSFER PUMP A	PROCESS CELL	1			
CE PROD RECEIVER AGITATOR A	PROCESS CELL	1			
1X PROD RECEIVER	PROCESS CELL	1	14000 GAL	13.5' DIA X 13.5' HIGH	STAINLESS STEEL
1X PROD RECEIVER COOLING COIL					
1X PROD RECEIVER TRANSFER PUMP A	PROCESS CELL	1			
1X ELUANT RECYCLE	PROCESS CELL	1	14000 GAL	13.5' DIA X 13.5' HIGH	STAINLESS STEEL
1X ELUANT RECYCLE COOLING COIL					
1X ELUANT RECYCLE TRANSFER PUMP A	PROCESS CELL	1			
1X ELUANT RECYCLE AGITATOR A	PROCESS CELL	1			
1X PUMP TANK	PROCESS CELL	1	1000 GAL		STAINLESS STEEL
1X PUMP TANK COOLING COIL					
1X PUMP TANK TRANSFER PUMP A	PROCESS CELL	1			
1X PUMP TANK AGITATOR A	PROCESS CELL	1			
1X WASTE RECEIVER	PROCESS CELL		2000 GAL		STAINLESS STEEL
1X WASTE RECEIVER COOLING COIL					
1X WASTE RECEIVER TRANSFER PUMP A	PROCESS CELL	1			
1X WASTE RECEIVER AGITATOR A	PROCESS CELL	1			
1X FEED STORAGE	PROCESS CELL	1	14000 GAL	13.5' DIA X 13.5' HIGH	STAINLESS STEEL
1X FEED STORAGE COOLING COIL					
1X FEED STORAGE TRANSFER PUMP A	PROCESS CELL	1			
1X FEED STORAGE AGITATOR A	PROCESS CELL	1			
SUMP COLLECTION TANK	PROCESS CELL	1	5000 GAL	10' DIA X10' HIGH	STAINLESS STEEL
SUMP COLLECTION TANK COOLING COIL					
SUMP COLLECTION TANK TRANSFER PUMP A	PROCESS CELL	1			

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ITEM	LOCATION	QTY	CAPACITY	DIMENSION	MATERIAL
SUMP COLLECTION TANK AGITATOR A	PROCESS CELL	1			
MS OFFGAS SCRUDEER RECYCLE TANK	PROCESS CELL	1	4000 GAL	10' D X 7' H	STAINLESS STEEL
MS OFFGAS STEER RCY TO CL COIL					
MS OFFGAS SCRUDEER RECYCLE TANK TRANSFER PUMP A	PROCESS CELL	1			
MS OFFGAS SCRUDEER RECYCLE TANK AGITATOR A	PROCESS CELL	1			
FEED MAKE UP TANK	PROCESS CELL	1	8000 GAL	10' DIA X 14' HIGH	STAINLESS STEEL
FEED MAKE UP TANK COOLING COIL					
FEED MAKE UP TANK	PROCESS CELL	1			
TRANSFER PUMP A					
FEED MAKE UP TANK AGITATOR A	PROCESS CELL	1			
FEED PUMP TANK	PROCESS CELL	1	8000 GAL	10' DIA X 14' HIGH	STAINLESS STEEL
FEED PUMP A					
FEED PUMP TANK	PROCESS CELL	1			
FEED PUMP A					
FEED PUMP TANK AGITATOR A	PROCESS CELL	1			
WASTE RECEIVER TANK	PROCESS CELL	1	8000 GAL	10' DIA X 14' HIGH	STAINLESS STEEL
WASTE RECEIVER TO COOLING COIL					
WASTE RECEIVER TANK TRANSFER PUMP A	PROCESS CELL	1			
WASTE RECEIVER TANK AGITATOR A	PROCESS CELL	1			
SOLVENT FEED TANK	PROCESS CELL	1	4000 GAL	8' DIA X 10' HIGH	STAINLESS STEEL
SOLVENT FEED TANK COOLING COIL					
SOLVENT FEED TANK	PROCESS CELL	1			
FEED PUMP A					
SOLVENT FEED TANK AGITATOR A	PROCESS CELL	1			
SOLVENT WASH WASTE TANK	PROCESS CELL	1	4000 GAL	8' DIA X 10' HIGH	STAINLESS STEEL
SOLVENT WASH WST TO COOLING COIL					
SOLVENT WASH WASTE TANK	PROCESS CELL	1			
FEED PUMP A					
SOLVENT WASH WASTE TANK AGITATOR A	PROCESS CELL	1			
SOLVENT STORAGE TANK	PROCESS CELL	1	4000 GAL	8' DIA X 10' HIGH	STAINLESS STEEL
SOLVENT STORAGE TANK COOLING COIL					
SOLVENT STORAGE TANK	PROCESS CELL	1			
TRANSFER PUMP A					
SOLVENT STORAGE TANK AGITATOR A	PROCESS CELL	1			

ITEM	LOCATION	QTY	CAPACITY	DIMENSION	MATERIAL
TRO PRODUCT RECEIVER	PROCESS CELL	1	1400 GAL	6 DIA X 9 HIGH	STAINLESS STEEL
TRO PRODUCT RECVR COOLING COIL					
TRO PRODUCT RECEIVER TRANSFER PUMP A	PROCESS CELL	1			
TRO CONCENTRATOR & STRIPPER (W/ PHASE COLL.)	PROCESS CELL	1	1400 GAL	5 DIA X 9 HIGH 1 DIA X 6' HIGH	HAUSSTELLOY
TRO CONCENTRATOR CONDENSER	PROCESS CELL	1		1'D X 5' LONG	STAINLESS STEEL
CONCENTRATED TRO RECEIVER A	PROCESS CELL	1	6000 GAL	10 DIA X 11' HIGH	STAINLESS STEEL
CONCTRO TRO RCVR A COOLING COIL					
CONCENTRATED TRO RECEIVER A TRANSFER PUMP A	PROCESS CELL	1			
CONCENTRATED TRO RECEIVER A AGITATOR A	PROCESS CELL	1			
CONCENTRATED TRO RECEIVER B	PROCESS CELL	1	6000 GAL	10 DIA X 11' HIGH	STAINLESS STEEL
CONCTRO TRO RCVR B COOLING COIL					
CONCENTRATED TRO RECEIVER B TRANSFER PUMP A	PROCESS CELL	1			
CONCENTRATED TRO RECEIVER B AGITATOR A	PROCESS CELL	1			
TRO CONDENSATE RECEIVER	PROCESS CELL	1	3000 GAL	8 DIA X 10' HIGH	STAINLESS STEEL
TRO CONDENSATE RECVR COOLING COIL					
TRO CONDENSATE RECEIVER TRANSFER PUMP A	PROCESS CELL	1			
TRO CONDENSATE RECEIVER AGITATOR A	PROCESS CELL	1			
REGENERATION WASTE TANK	PROCESS CELL	1	1000 GAL	4'DIA X 10' HIGH	STAINLESS STEEL
REGENERATION WASTE TX COOLING COIL					
PHF FILTER A	PROCESS CELL	1	20 GPM	2'D X 8' LONG	STAINLESS STEEL
PHF FILTER B	PROCESS CELL	1	20 GPM	2'D X 8' LONG	STAINLESS STEEL
PRECOAT FEED TANK	PROCESS CELL	1	1000 GAL	4'D X 10'H	STAINLESS STEEL
PRECOAT FEED TANK COOLING COIL					
PRECOAT FEED TANK TRANSFER PUMP A	PROCESS CELL	1			
PRECOAT FEED TANK AGITATOR A	PROCESS CELL	1			
NHS SCRUBBER CONCENTRATOR RECVR	PROCESS CELL	1	1000 GAL	5'D X 7'H	STAINLESS STEEL
NHS SCRUB CONCH RCVR COOL COIL					
NHS SCRUBBER CONCENTRATOR RECVR TRANSFER PUMP A	PROCESS CELL	1			
NHS SCRUBBER CONCENTRATOR RECVR AGITATOR A	PROCESS CELL	1			

ITEM	LOCATION	QTY	CAPACITY	DIMENSION	MATERIAL
NH3 SCRUBBER CONDENSATE HEATER	PROCESS CELL	1	4000 GAL	10' D X 7' H	STAINLESS STEEL
NH3 SCSSR CONDST REC COOL COIL					
NH3 SCRUBBER CONDENSATE HEATER TRANSFER PUMP A	PROCESS CELL	1			
NH3 SCRUBBER CONDENSATE HEATER AGITATOR A	PROCESS CELL	1			
TRUET EXTRACTION MODULE EXTRACT CENTRIFUGAL CONTACTORS	PROCESS CELL	1		MODULE 4' W X 12' L X 8' H	STAINLESS STEEL
TRUET SCRUB MODULE SCRUB CENTRIFUGAL CONTACTORS	PROCESS CELL	1		MODULE 4' W X 8' L X 8' H	STAINLESS STEEL
TRUET STRIPPER MODULE STRIP CENTRIFUGAL CONTACTORS	PROCESS CELL	1		MODULE 4' W X 10' L X 8' H	STAINLESS STEEL
TRUET SOLVENT WASH MODULE WASH CENTRIFUGAL CONTACTORS	PROCESS CELL	1		MODULE 2' W X 10' L X 8' H	STAINLESS STEEL
1" SOLVENT COLUMN	PROCESS CELL	1		1' D X 6' H	STAINLESS STEEL
1" COLUMN	PROCESS CELL	1	3000 GAL	6' D X 15' H	STAINLESS STEEL
CE CONCENTRATOR	PROCESS CELL	1	10 BFM	15' H	STAINLESS STEEL
CE CONCENTRATOR CONDENSER	PROCESS CELL	1		2' D X 6' L	STAINLESS STEEL
NH3 SCRUBBER SOLUTION CONCENTRATOR	PROCESS CELL	1	20 BFM	15' H	STAINLESS STEEL
NH3 OFF-GAS SCRUBBER W/BUBBLE CAP TRAYS	PROCESS CELL	1		6' D X 12' H	STAINLESS STEEL
NH3 SCRUBBER CONCENTRATOR CONDENSER	PROCESS CELL	1	20 BFM	3' D X 7' H	STAINLESS STEEL
OFF-GAS HEATER	PROCESS CELL	1	1500 SCFH		STAINLESS STEEL
OFF-GAS FILTER	PROCESS CELL	1	1500 SCFH		STAINLESS STEEL
TRAP JETS	PROCESS CELL	30			STAINLESS STEEL
SUMP JETS	PROCESS CELL	6	25 BFM		STAINLESS STEEL
TOTAL IN-CELL EQUIPMENT					
SCRUB SOLUTION FEED TANK	IN BLDG/OUT-OF-CELL	1	500 GAL	4' 6" DIA X 5' H	STAINLESS STEEL
SCRUB SOLUTION FEED TANK TRANSFER PUMP A	IN BLDG/OUT-OF-CELL	1			
SCRUB SOLUTION FEED TANK AGITATOR A	IN BLDG/OUT-OF-CELL	1			
STRIP SOLUTION FEED TANK	IN BLDG/OUT-OF-CELL	1	500 GAL	4' 6" DIA X 5' H	STAINLESS STEEL

ITEM	LOCATION	QTY	CAPACITY	DIMENSION	MATERIAL
STRIP SOLUTION FEED TANK TRANSFER PUMP A	IN BLDG/OUT-OF-CELL	1			
STRIP SOLUTION FEED TANK AGITATOR A	IN BLDG/OUT-OF-CELL	1			
WASH SOLUTION FEED TANK	IN BLDG/OUT-OF-CELL	1	500 GAL	4'6" DIA X 5'H	STAINLESS STEEL
WASH SOLUTION FEED TANK TRANSFER PUMP A	IN BLDG/OUT-OF-CELL	1			
WASH SOLUTION FEED TANK AGITATOR A	IN BLDG/OUT-OF-CELL	1			
SOLVENT MAKEUP TANK	IN BLDG/OUT-OF-CELL	1	500 GAL	4'6" DIA X 5'H	STAINLESS STEEL
SOLVENT MAKEUP TANK TRANSFER PUMP A	IN BLDG/OUT-OF-CELL	1			
SOLVENT MAKEUP TANK AGITATOR A	IN BLDG/OUT-OF-CELL	1			
IX REGENERATION MAKEUP TANK	IN BLDG/OUT-OF-CELL	1	500 GAL	4'6" DIA X 5'H	STAINLESS STEEL
IX REGENERATION MAKEUP TANK PUMP A	IN BLDG/OUT-OF-CELL	1			
IX REGENERATION MAKEUP TANK AGITATOR A	IN BLDG/OUT-OF-CELL	1			
0.1M NITRIC ACID ADDITION TANK	IN BLDG/OUT-OF-CELL	1	500 GAL	4'6" DIA X 5'H	STAINLESS STEEL
0.1M NITRIC ACID ADDITION TANK TRANSFER PUMP A	IN BLDG/OUT-OF-CELL	1			
0.1M NITRIC ACID ADDITION TANK AGITATOR A	IN BLDG/OUT-OF-CELL	1			
0.3M NITRIC ACID ADDITION TANK	IN BLDG/OUT-OF-CELL	1	500 GAL	4'6" DIA X 5'H	STAINLESS STEEL
0.3M NITRIC ACID ADDITION TANK TRANSFER PUMP A	IN BLDG/OUT-OF-CELL	1			
0.3M NITRIC ACID ADDITION TANK AGITATOR A	IN BLDG/OUT-OF-CELL	1			
0.5M SODIUM HYDROXIDE ADDITION TANK	IN BLDG/OUT-OF-CELL	1	500 GAL	4'6" DIA X 5'H	STAINLESS STEEL
0.5M SODIUM HYDROXIDE ADDITION TANK - PUMP A	IN BLDG/OUT-OF-CELL	1			
0.5M SODIUM HYDROXIDE ADDITION TANK - AGITATOR A	IN BLDG/OUT-OF-CELL	1			
0.5M SODIUM HYDROXIDE ADDITION TANK	IN BLDG/OUT-OF-CELL	1	500 GAL	4'6" DIA X 5'H	STAINLESS STEEL
0.5M SODIUM HYDROXIDE ADDITION TANK - TRANSFER PUMP A	IN BLDG/OUT-OF-CELL	1			
0.5M SODIUM HYDROXIDE ADDITION TANK - AGITATOR A	IN BLDG/OUT-OF-CELL	1			
PRE-COAT FEED TANK	IN BLDG/OUT-OF-CELL	1	500 GAL	4'6" DIA X 5'H	STAINLESS STEEL

ITEM	LOCATION	QTY	CAPACITY	DIMENSION	MATERIAL
PRE-DMT FEED TANK TRANSFER PUMP A	IN BLDG/OUT-OF-CELL	1			
PRE-CO ₂ FEED TANK AGITATOR A	IN BLDG/OUT-OF-CELL	1			
12F NITRIC ACID ADDITION TANK	IN BLDG/OUT-OF-CELL	1	500 GAL	4'6"DIA X 5'H	STAINLESS STEEL
12M NITRIC ACID ADDITION TANK TRANSFER PUMP A	IN BLDG/OUT-OF-CELL	1			
12N NITRIC ACID ADDITION TANK AGITATOR A	IN BLDG/OUT-OF-CELL	1			
PEROXIDE FEED TANK	IN BLDG/OUT-OF-CELL	1	500 GAL	4'6"DIA X 5'H	STAINLESS STEEL
PEROXIDE FEED TANK TRANSFER PUMP A	IN BLDG/OUT-OF-CELL	1			
PEROXIDE FEED TANK AGITATOR A	IN BLDG/OUT-OF-CELL	1			
SLUDGE RECEIVER SODIUM NITRITE ADDITION TANK	IN BLDG/OUT-OF-CELL	1	500 GAL	4'6"DIA X 5'H	STAINLESS STEEL
SLUDGE RECEIVER SODIUM NITRITE ADDITION TANK-PUMP A	IN BLDG/OUT-OF-CELL	1			
SLUDGE RECEIVER SODIUM NITRITE ADDITION TANK-AGITATOR A	IN BLDG/OUT-OF-CELL	1			
LOW LEVEL WASTE TANK SODIUM NITRITE ADDITION TANK	IN BLDG/OUT-OF-CELL	1	500 GAL	4'6"DIA X 5'H	STAINLESS STEEL
LOW LEVEL WASTE TANK SODIUM NITRITE ADDITION TANK-PUMP A	IN BLDG/OUT-OF-CELL	1			
LOW LEVEL WASTE TANK SODIUM NITRITE ADDITION TANK-AGITATOR A	IN BLDG/OUT-OF-CELL	1			
1X WASTE TANK (CS)	IN BLDG/OUT-OF-CELL	1	500 GAL	4'6"DIA X 5'H	STAINLESS STEEL
1X WASTE TANK (CS) TRANSFER PUMP A	IN BLDG/OUT-OF-CELL	1			
1X WASTE TANK (CS) AGITATOR A	IN BLDG/OUT-OF-CELL	1			
OFF-GAS TREATMENT SODIUM NITRITE TANK	IN BLDG/OUT-OF-CELL	1	500 GAL	4'6"DIA X 5'H	STAINLESS STEEL
OFF-GAS TREATMENT SODIUM NITRITE TANK - PUMP A	IN BLDG/OUT-OF-CELL	1			
OFF-GAS TREATMENT SODIUM NITRITE TANK - AGITATOR A	IN BLDG/OUT-OF-CELL	1			
UTILITY TANK	IN BLDG/OUT-OF-CELL	1	500 GAL	4'6"DIA X 5'H	STAINLESS STEEL
UTILITY TANK TRANSFER PUMP A	IN BLDG/OUT-OF-CELL	1			
UTILITY TANK AGITATOR A	IN BLDG/OUT-OF-CELL	1			
1X WASTE TANK TRANSFER PUMP A	IN BLDG/OUT-OF-CELL	1	500 GAL	4'6"DIA X 5'H	STAINLESS STEEL

ITEM	LOCATION	QTY	CAPACITY	DIMENSION	MATERIAL
1.1 MIXTURE TAN AGITATOR A	IN BLDG/OUT-OF-CELL	1			
ELEMENT RECEPTION TAN	IN BLDG/OUT-OF-CELL	1	500 GAL	4'6" DIA X 5' H	STAINLESS STEEL
ELEMENT RECEPTION TAN TRANSFER PUMP A	IN BLDG/OUT-OF-CELL	1			
ELEMENT ADDITION TAN AGITATOR A	IN BLDG/OUT-OF-CELL	1			
TOTAL COLD CHEMICAL IN BLDG					
NITRIC ACID STORAGE TAN	NOT IN BLDG/ OUT-OF-CELL	4	20000 GAL	15'-0" D X 15'-6" HIGH	STAINLESS STEEL
NITRIC ACID STORAGE TAN TRANSFER PUMP A	NOT IN BLDG/ OUT-OF-CELL	4			
SODIUM HYDROXIDE STORAGE TAN	NOT IN BLDG/ OUT-OF-CELL	3	20000 GAL	15'-0" D X 15'-6" HIGH	CARBON STEEL
SODIUM HYDROXIDE STAG TAN TRANSFER PUMP A	NOT IN BLDG/ OUT-OF-CELL	3			
HYDROGEN PEROXIDE STORAGE T1	NOT IN BLDG/ OUT-OF-CELL	12	20000 GAL	9'-0" D X 4' LONG	ALUMINUM
HYDROGEN PEROXIDE STORAGE T1 TRANSFER PUMP A	NOT IN BLDG/ OUT-OF-CELL	12			
SC-OF SOLUTION MIX TAN	NOT IN BLDG/ OUT-OF-CELL	1	2000 GAL	7'-0" D X 7'-0" HIGH	STAINLESS STEEL
SC-OF SOLUTION MIX TAN	NOT IN BLDG/ OUT-OF-CELL	1			
SC-OF SOLUTION MIX TAN TRANSFER PUMP A	NOT IN BLDG/ OUT-OF-CELL	1			
SC-OF SOLUTION MIX TAN AGITATOR A	NOT IN BLDG/ OUT-OF-CELL	1			
STRIP SOLUTION MIX TAN	NOT IN BLDG/ OUT-OF-CELL	1	2000 GAL	7'-0" D X 7'-0" HIGH	STAINLESS STEEL
STRIP SOLUTION MIX TAN TRANSFER PUMP A	NOT IN BLDG/ OUT-OF-CELL	1			
STRIP SOLUTION MIX TAN AGITATOR A	NOT IN BLDG/ OUT-OF-CELL	1			
WASH SOLUTION MIX TAN	NOT IN BLDG/ OUT-OF-CELL	1	2000 GAL	7'-0" D X 7'-0" HIGH	STAINLESS STEEL
WASH SOLUTION MIX TAN TRANSFER PUMP A	NOT IN BLDG/ OUT-OF-CELL	1			
WASH SOLUTION MIX TAN AGITATOR A	NOT IN BLDG/ OUT-OF-CELL	1			
NPH RECEIPT/STORAGE TAN	NOT IN BLDG/ OUT-OF-CELL	1	2000 GAL	7'-0" D X 7'-0" HIGH	STAINLESS STEEL
NPH RECEIPT/STORAGE TAN TRANSFER PUMP A	NOT IN BLDG/ OUT-OF-CELL	1			
TBP RECEIPT/STORAGE TAN	NOT IN BLDG/ OUT-OF-CELL	1	2000 GAL	7'-0" D X 7'-0" HIGH	STAINLESS STEEL
TBP RECEIPT/STORAGE TAN TRANSFER PUMP A	NOT IN BLDG/ OUT-OF-CELL	1			

ITEM	LOCATION	QTY	CAPACITY	DIMENSION	MATERIAL
CERO MIX TANK OUT-OF-CELL	NOT IN BLDG/ OUT-OF-CELL	1	500 GAL	4'6" D X 5'0" HIGH	STAINLESS STEEL
CERO MIX TANK TRANSFER PUMP A OUT-OF-CELL	NOT IN BLDG/ OUT-OF-CELL	1			
CERO MIX TANK AGITATOR A OUT-OF-CELL	NOT IN BLDG/ OUT-OF-CELL	1			
SOLVENT MIX TANK OUT-OF-CELL	NOT IN BLDG/ OUT-OF-CELL	1	500 GAL	4'6" D X 5'0" HIGH	STAINLESS STEEL
SOLVENT MIX TANK TRANSFER PUMP A OUT-OF-CELL	NOT IN BLDG/ OUT-OF-CELL	1			
SOLVENT MIX TANK AGITATOR A OUT-OF-CELL	NOT IN BLDG/ OUT-OF-CELL	1			
NITRIC ACID DILUTION TANK OUT-OF-CELL	NOT IN BLDG/ OUT-OF-CELL	3	500 GAL	4'6" D X 5'0" HIGH	STAINLESS STEEL
NITRIC ACID DILUTION TANK TRANSFER PUMP A OUT-OF-CELL	NOT IN BLDG/ OUT-OF-CELL	3			
NITRIC ACID DILUTION TANK AGITATOR A OUT-OF-CELL	NOT IN BLDG/ OUT-OF-CELL	3			
SODIUM HYDROXIDE DILUTION TANK OUT-OF-CELL	NOT IN BLDG/ OUT-OF-CELL	2	500 GAL	4'6" D X 5'0" HIGH	STAINLESS STEEL
SODIUM HYDROXIDE DILUTION TANK TRANSFER PUMP A OUT-OF-CELL	NOT IN BLDG/ OUT-OF-CELL	2			
SODIUM HYDROXIDE DILUTION TANK AGITATOR A OUT-OF-CELL	NOT IN BLDG/ OUT-OF-CELL	2			
SODIUM NITRATE MIX TANK OUT-OF-CELL	NOT IN BLDG/ OUT-OF-CELL	1	500 GAL	4'6" D X 5'0" HIGH	STAINLESS STEEL
SODIUM NITRATE MIX TANK TRANSFER PUMP A OUT-OF-CELL	NOT IN BLDG/ OUT-OF-CELL	1			
SODIUM NITRATE MIX TANK AGITATOR A OUT-OF-CELL	NOT IN BLDG/ OUT-OF-CELL	1			
PRECEDAT MIX TANK OUT-OF-CELL	NOT IN BLDG/ OUT-OF-CELL	1	500 GAL	4'6" D X 5'0" HIGH	STAINLESS STEEL
PRECEDAT MIX TANK TRANSFER PUMP A OUT-OF-CELL	NOT IN BLDG/ OUT-OF-CELL	1			
PRECEDAT MIX TANK AGITATOR A OUT-OF-CELL	NOT IN BLDG/ OUT-OF-CELL	1			
TOTAL COLD CHEMICAL OUT OF BLDG					
REG MAINTENANCE EQUIPMENT	REG MAINT SHOP	LOT			
NON-REG MAINTENANCE EQUIPMENT	NON-REG SHOP	LOT			
MSM REPAIR EQUIPMENT	MSM REPAIR	LOT			
TOTAL REGULATED, NON-REGULATED & MSM REPAIR					

ITEM	LOCATION	QTY	CAPACITY	DIMENSION	MATERIAL
PNEUMATIC TRANSFER SYSTEM	ANALYTICAL CELLS	4		2"	STAINLESS STEEL
DETON GLOVE BOX	MSR REPAIR	1			STAINLESS STEEL
CMC DECON EQUIPMENT		LOT			
TOTAL EQUIPMENT DECON REPAIR & MAINTENANCE					
TRANSFER DRAINERS	SAMPLE/ANALYT ROOM	4		2' X 2' X 2'	STAINLESS STEEL
SAMPLE MODULES	SAMPLE CELLS	33	15 HL		STAINLESS STEEL
TOTAL PROCESS SAMPLING					
HOT LAB EQUIPMENT	HOT LAB	LOT			STAINLESS STEEL
COLD LAB EQUIPMENT	COLD LAB	LOT			
TOTAL ANALYTICAL FACILITIES					
CRANE	CANYON/OUT-OF-CELL	1	30 TON	75' X 11' X 20'	CARBON STEEL
60" SHIELD WINDOWS	MAINT. REMOTE CELLS	6			LEAD GLASS
28" SHIELD WINDOWS	SAMPLE REMOTE CELLS	10			LEAD GLASS
MASTER SLAVE MANIPULATORS	VARIOUS REMOTE CELLS	32	MODEL F		STAINLESS STEEL
ELECT MECH MANIPULATORS	REMOTE MAIN CELLS	3	PAN 3000		STAINLESS STEEL
MSR CARTS	MSR REPAIR	3	SINGLE		CARBON STEEL
SHIELD WINDOW CART	MAINT AREA	1			CARBON STEEL
CDMC CRANE	CDMC	1	7.5 TON		CARBON STEEL
CMR SHIELD DOOR/HOIST	CMR				STAINLESS STEEL
CRANE BLOCKS, YOLDS, & RAILS	CANYON	LOT	30 TON		STAINLESS STEEL
CUT-UP ROOM EQUIPMENT	CUT-UP ROOM	LOT			
FECA REMOTE LIGHTS	FECA	4			STAINLESS STEEL
TOTAL REMOTE HANDLING EQUIPMENT					
TOTAL GRAND, ALL EQUIPMENT					











FACILITY DRAWINGS

WESTINGHOUSE

ALTERNATIVE

DRAWING LIST

<u>DRAWING No.</u>	<u>DRAWING TITLE</u>
ES-800-01	PRE-TREATMENT FACILITY PLAN (+130'-0")
ES-800-02	PRE-TREATMENT FACILITY PLAN (+115'-0")
ES-800-03	PRE-TREATMENT FACILITY PLAN (+14'-0")
ES-800-04	PRE-TREATMENT FACILITY PLAN (+121'-0")
ES-800-05	BUILDING ELEVATION - SECTION A
ES-800-06	BUILDING ELEVATION - SECTION B
ES-800-07	BUILDING ELEVATION - SECTION C
ES-800-08	PRE-TREATMENT FACILITY COLL. CHEMICAL SUPPLY AREA
ES-800-09	PRE-TREATMENT FACILITY COLL. EQUIPMENT ARRANGEMENT

PLAN VIEW #1 (-)30'-0"



PRELIMINARY

NOT APPROVED FOR CONSTRUCTION

U.S. DEPARTMENT OF ENERGY
RICHLAND OPERATIONS OFFICE
KAISER ENGINEERS HANFORD COMPANY

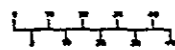
PRE-TREATMENT
FACILITY
PLAN (-)30'-0"

MSYP PRE-TREATMENT FACILITY

700	DR-1309	20
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1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100
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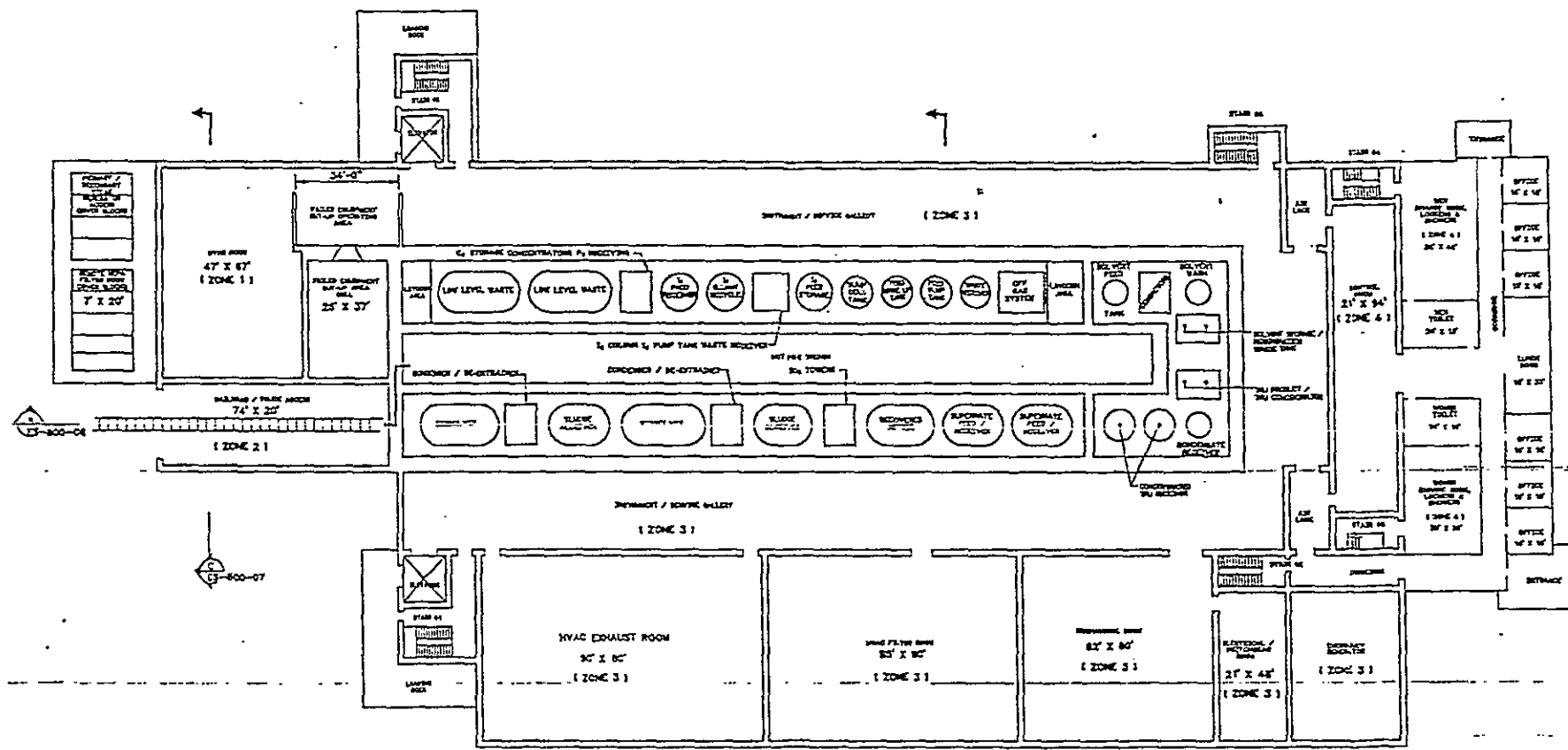
ES-800-0111



NOT APPROVED FOR CONSTRUCTION

PRE-TREATMENT
FACILITY
PLAN (-)13'-0"

[illegible]



PLAN VIEW #3 (+) 4'-0"

PRELIMINARY

NOT APPROVED FOR CONSTRUCTION

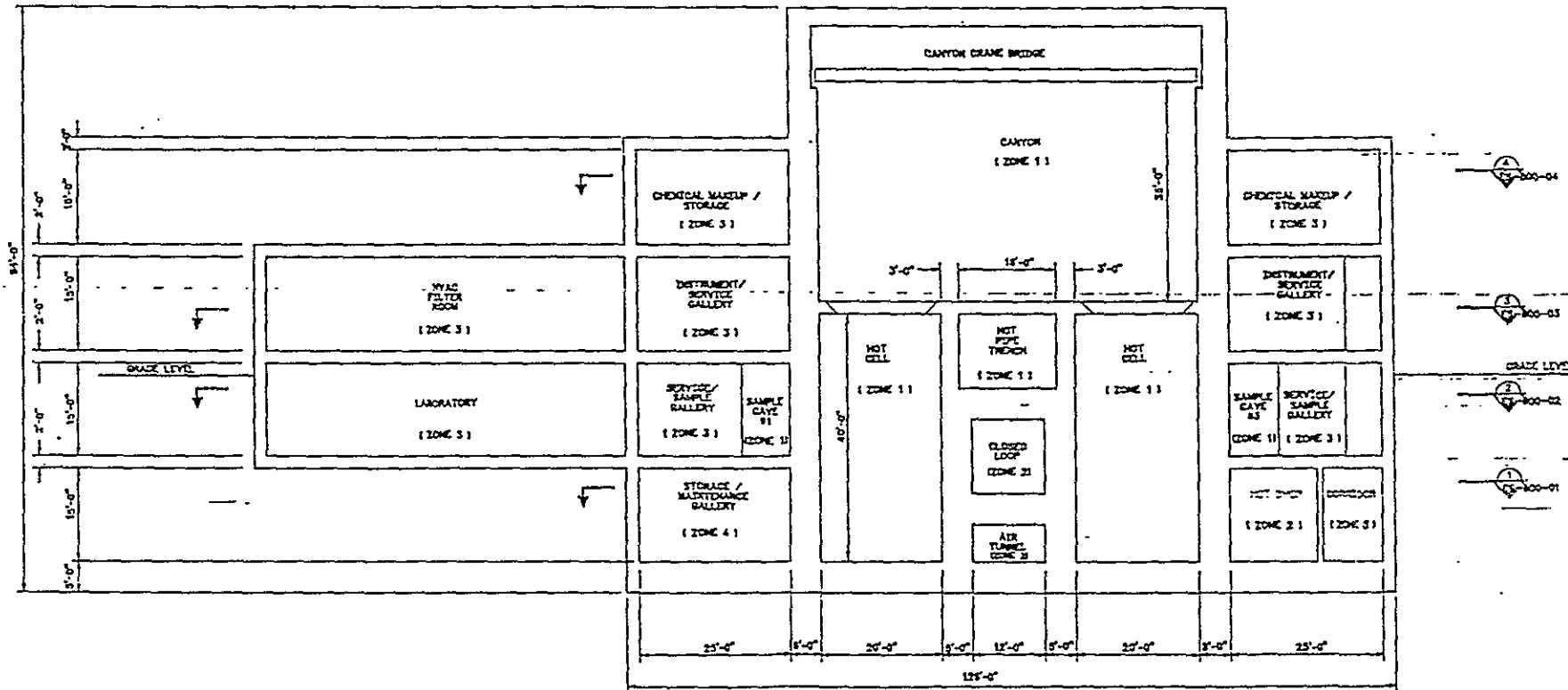
U.S. DEPARTMENT OF ENERGY
 REGIONAL OPERATIONS OFFICE
 KAISER ENGINEERS HANFORD COMPANY

PRE-TREATMENT
 FACILITY
 PLAN (+) 4'-0"

PROJECT NO. HVPF PRE-TREATMENT FACILITY
 SHEET NO. ES-800-03
 DATE 11/1/80

NO.	DATE	BY	CHKD.	DESCRIPTION
1	11/1/80	ES-800-03	ES-800-03	ES-800-03

911211302



BUILDING ELEVATION - SECTION A
SCALE: 1/8"=1'-0"

7 PRELIMINARY

NOT APPROVED FOR CONSTRUCTION

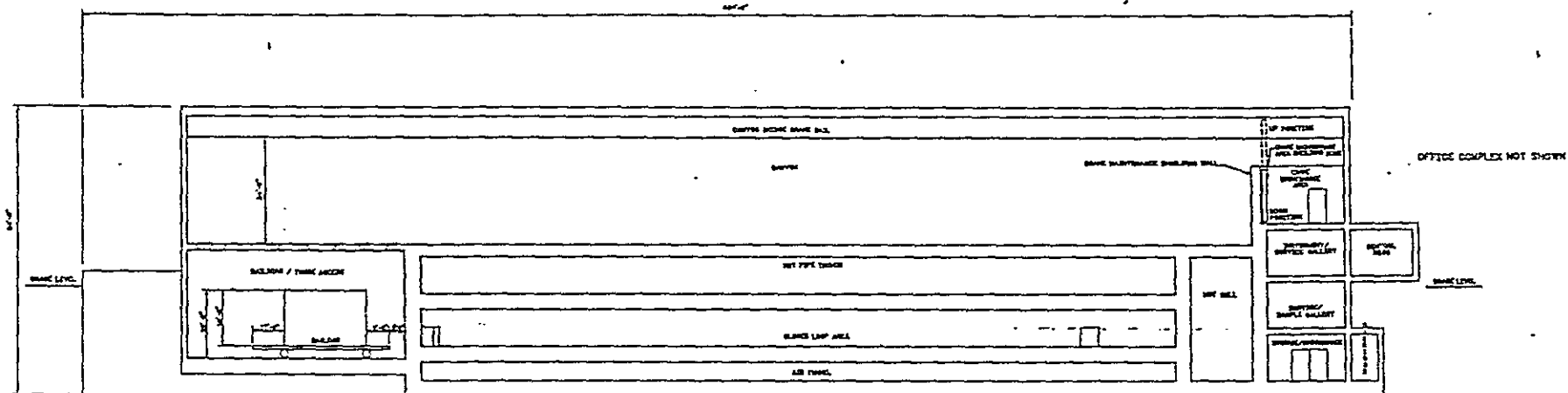
U.S. DEPARTMENT OF ENERGY
HIGH-LEVEL WASTE OPERATIONS OFFICE
KAISER ENGINEERS HANFORD COMPANY

PRE-TREATMENT FACILITY
ELEVATION A

DATE	BY	APPROVAL	REVISION
10/1/77	SA	SA	1
10/1/77	SA	SA	2
10/1/77	SA	SA	3
10/1/77	SA	SA	4
10/1/77	SA	SA	5
10/1/77	SA	SA	6
10/1/77	SA	SA	7
10/1/77	SA	SA	8
10/1/77	SA	SA	9
10/1/77	SA	SA	10

15-800-05 1110

911211.1303



BUILDING ELEVATION - SECTION B

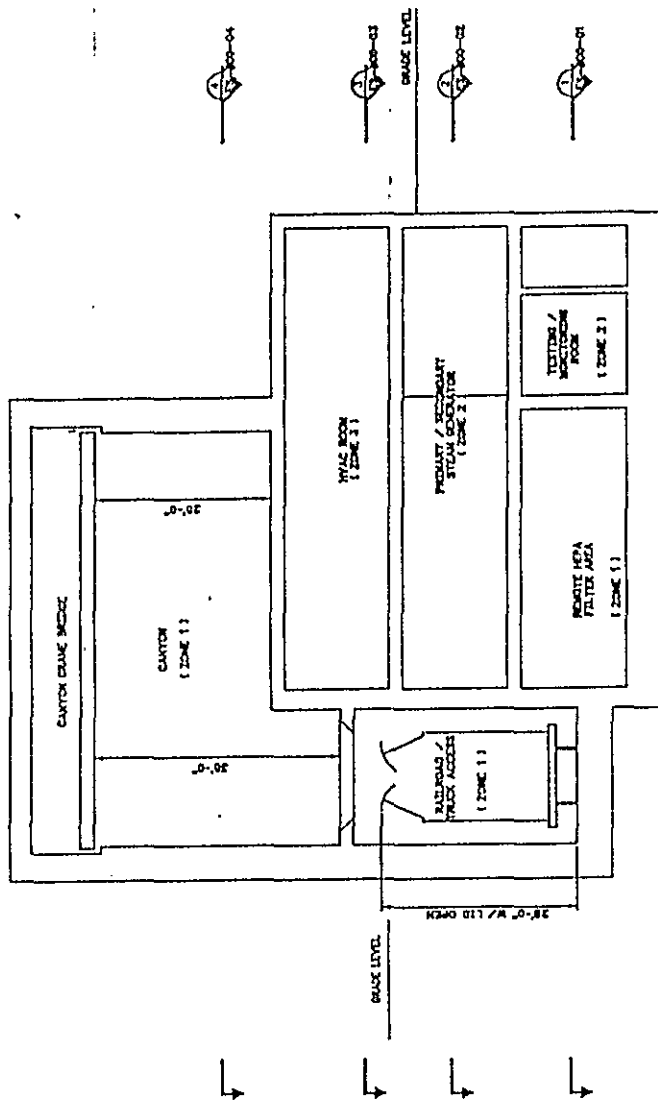


PRELIMINARY

NOT APPROVED FOR CONSTRUCTION

U.S. DEPARTMENT OF ENERGY		RESEARCH AND DEVELOPMENT OFFICE	
KAISER ENGINEERS HANFORD COMPANY		PROJECT NO. ES-1245	
PRE-TREATMENT FACILITY		DATE 3-1-68	
ELEVATION B		DRAWN BY SA DRED	
CHECKED BY RD CAMPBELL		SCALE 1/8" = 1'-0"	
PROJECT NO. ES-1245		SHEET NO. 1110	

REVISION	DATE	BY	DESCRIPTION
1	3-1-68	SA DRED	INITIAL DESIGN
2	3-1-68	RD CAMPBELL	REVISION



BUILDING ELEVATION - SECTION C
SCALE 1/8" = 1'-0"

PRELIMINARY

NOT APPROVED FOR CONSTRUCTION

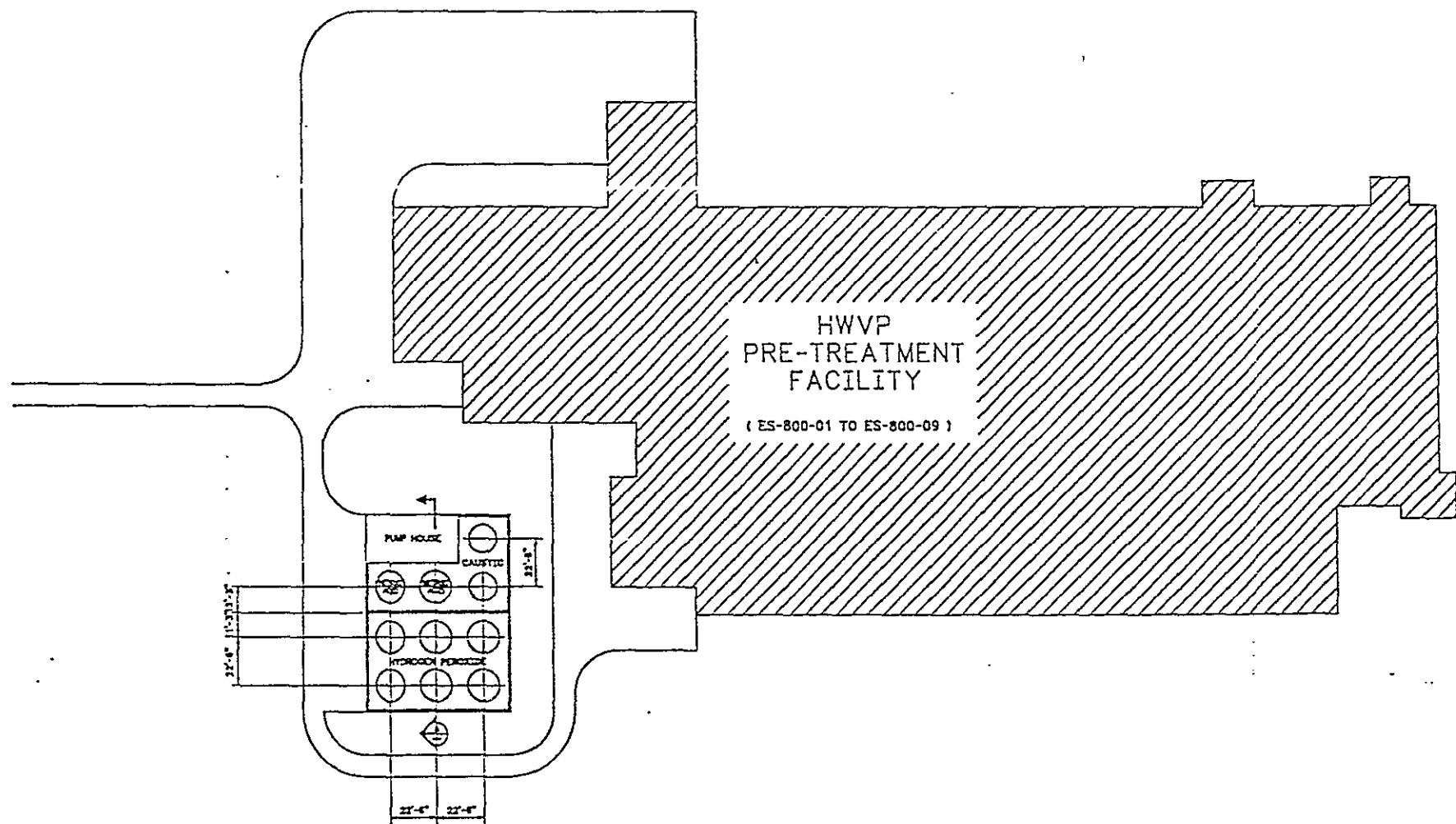
U.S. DEPARTMENT OF ENERGY
HIGHLAND OPERATIONS OFFICE

PRE-TREATMENT
FACILITY
ELEVATION C

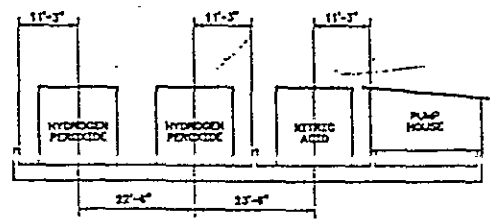
[illegible]

ES-800-07	111	0
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911211105



PLAN
N.T.S.



SECTION
A-A
N.T.S.

ITEM	QTY	UNIT
HYDROGEN PEROXIDE	150 ± 15M	6
SODIUM HYDROXIDE (CAUSTIC)	150 ± 15M	2
NITRIC ACID	150 ± 15M	2

REVISION	DATE	BY	DESCRIPTION
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

4 PRELIMINARY

NOT APPROVED FOR CONSTRUCTION

U.S. DEPARTMENT OF ENERGY
NORAND OPERATIONS OFFICE
NORAND ENGINEERING TECHNOLOGY COMPANY

PRE-TREATMENT
FACILITY
COLD CHEMICAL
SUPPLY AREA

HWVP PRE-TREATMENT FACILITY

NO. 1329 344800

SCALE 1" = 10' 10'

ES-800-08 1 1 0

224'-0"

62'-0"

CELL C

CELL B

CELL A

25'-0"

45'-0"

224'-0"

LAYDOWN AREA

11, 12, 13, 14, 15, 16, 17, 18, 20, 21, 22, 19, 23, 24, 25, 26, 32, 27, 28, 29, 30, 31

1, 2, 3, 4, 5, 6, 7, 8, 9, 10

- | | |
|---|---------------------------------|
| 1. DISSOLVER | 17. I _x FEED STORAGE |
| 2. CONDENSER / DE-ENTRAINER | 18. SUMP COLLECTION TANK |
| 3. SLUDGE RECEIVER | 19. OFF GAS SYSTEM |
| 4. DISSOLVER | 20. FEED MAKE UP TANK |
| 5. CONDENSER / DE-ENTRAINER | 21. FEED PUMP TANK |
| 6. SLUDGE RECEIVER | 22. WASTE RECEIVER |
| 7. NO _x TOWERS | 23. SOLVENT FEED TANK |
| 8. RECOVERED NITRIC | 24. CONTACTORS |
| 9. SUPERNATE FEED / RECEIVER | 25. SOLVENT WASH |
| 10. SUPERNATE FEED / RECEIVER | 26. SOLVENT STORAGE |
| 11. LOW LEVEL WASTE | 27. TRU PRODUCT |
| 12. LOW LEVEL WASTE | 28. TRU CONCENTRATOR |
| 13. C _s STORAGE/CONCENTRATORS/ <u>PROD RECEIVER</u> | 29. CONCENTRATED TRU RECEIVER |
| 14. I _x PRODUCT RECEIVER | 30. CONCENTRATED TRU RECEIVER |
| 15. I _x ELUANT RECYCLE | 31. CONDENSATE RECEIVER |
| 16. I _x COLUMN I _x PUMP TANK WASTE RECEIVER | 32. REGENERATION WASTE TANK |

PRELIMINARY

NOT APPROVED FOR CONSTRUCTION

SA [redacted] [redacted]		DIRECTOR [redacted]	
[redacted]		U.S. DEPARTMENT OF ENERGY	
[redacted]		Sheldon Chemical Complex	
[redacted]		WASTE CHARACTERIZATION DIVISION	
[redacted]		HWVE	
[redacted]		PRE-TREATMENT	
[redacted]		CELL EOPT LAYOUT	
[redacted]		HWVE PRE-TREATMENT FACILITY	
[redacted]		F [redacted] ES-800-09 [redacted]	
[redacted]		[redacted] 12-17-88 [redacted]	

[illegible]

PLAN A

 PRELIMINARY

NOT APPROVED FOR CONSTRUCTION

U.S. DEPARTMENT OF ENERGY ROCKLAND OPERATIONS OFFICE	KAISER ENGINEERS HANFORD COMPANY
HWVP PRE-TREATMENT BLDG MODIFICATIONS	

MAYP PRE-TREATMENT FACILITY			
NO.	EX-1349	DATE	244300

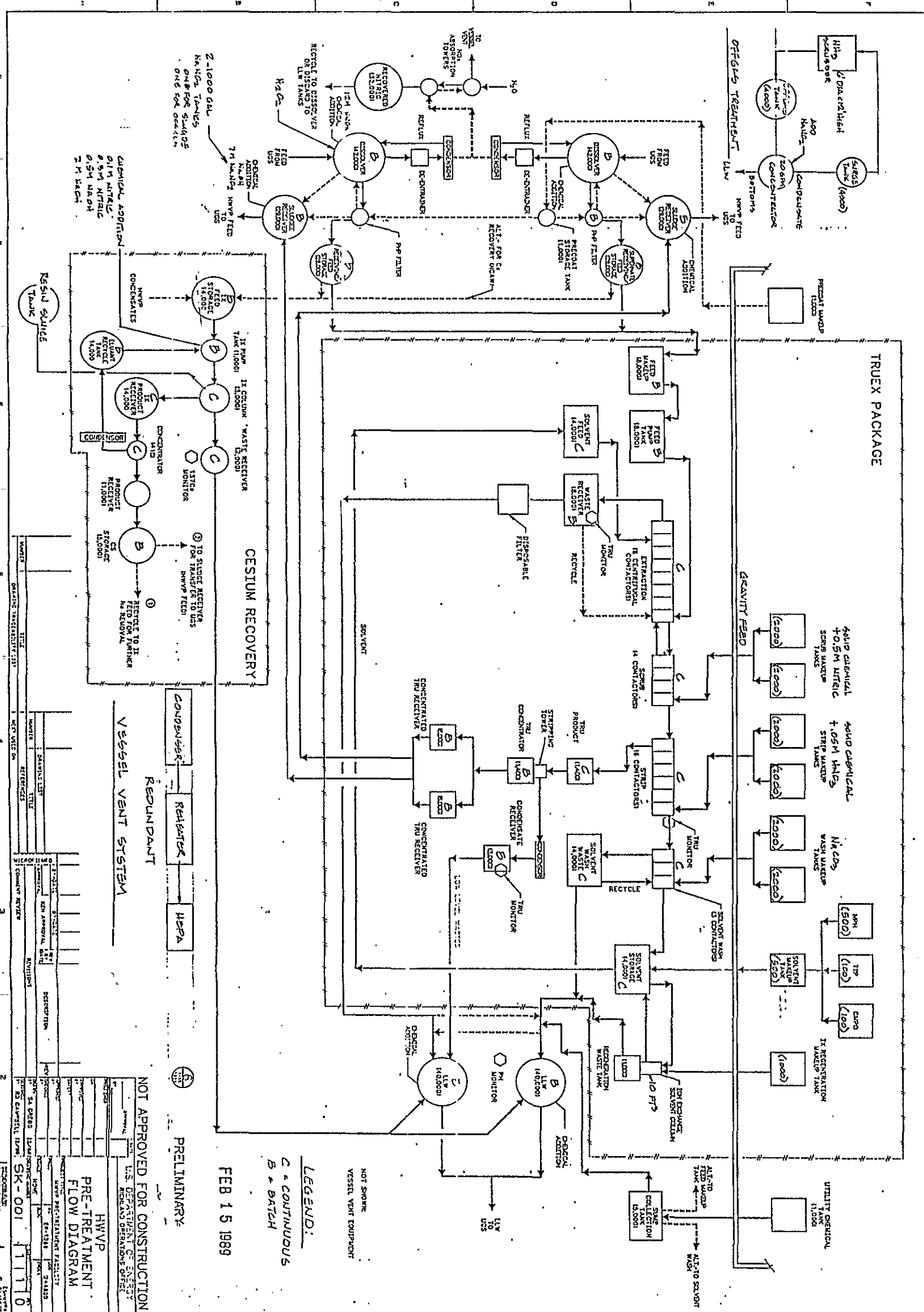
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[illegible]

APPENDIX E

UPDATED FLOW DIAGRAM

6 1 2 1 1 6

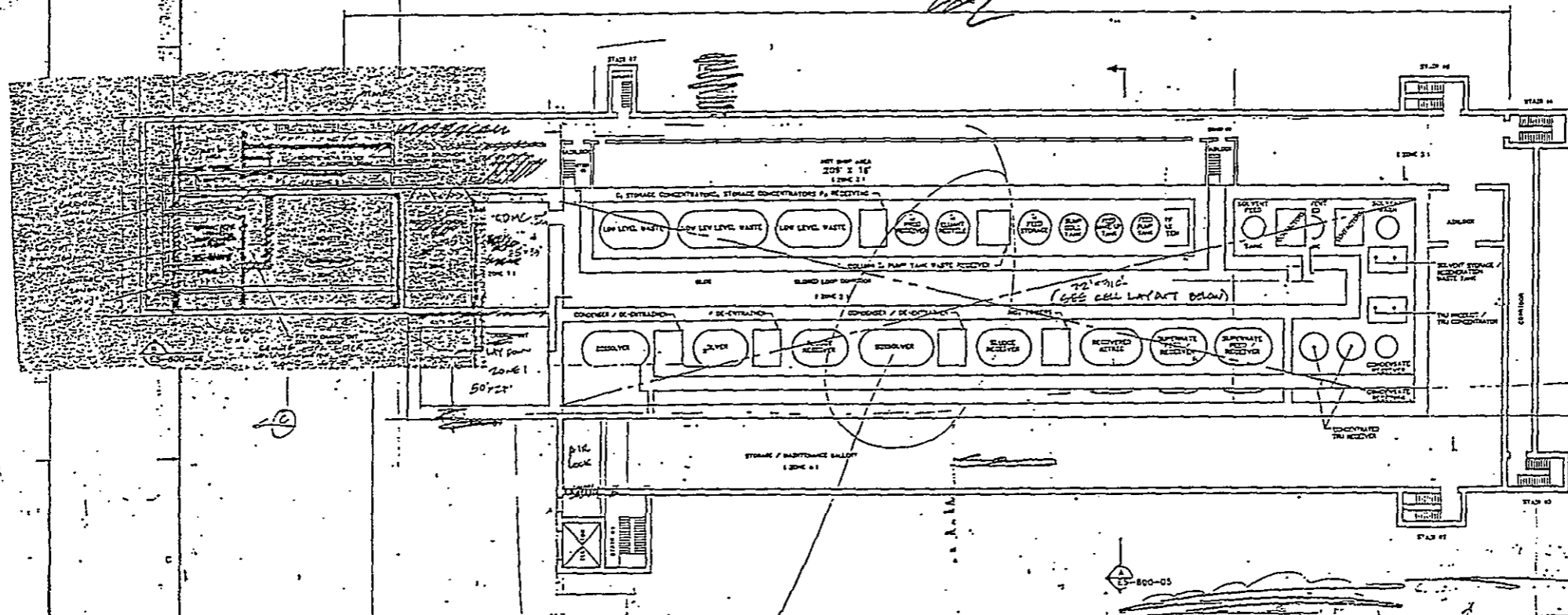


APPENDIX F

FACILITY DRAWINGS STAND-ALONE ALTERNATIVE

91121131010

91121311



9307.0

FEB 15 1989

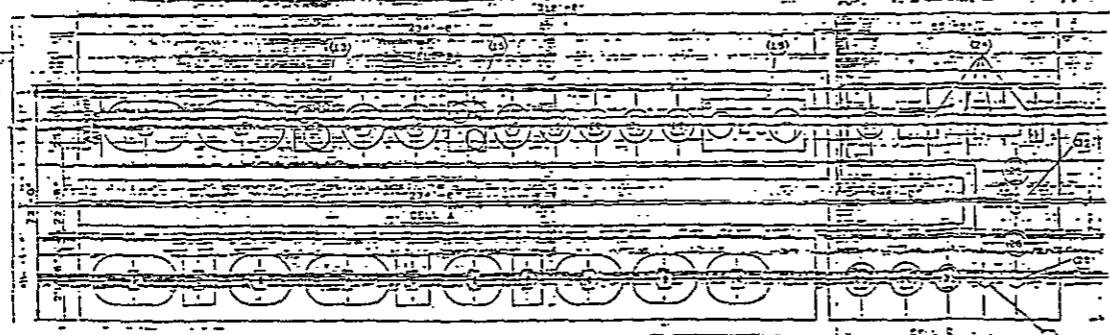
DRAWING LIST

DRAWING No.	DRAWING TITLE
ES-800-01	PRE-TREATMENT FACILITY PLAN (-130'-0")
ES-800-02	PRE-TREATMENT FACILITY PLAN (-115'-0")
ES-800-03	PRE-TREATMENT FACILITY PLAN (-100'-0")
ES-800-04	PRE-TREATMENT FACILITY PLAN (-125'-0")
ES-800-05	BUILDING ELEVATION - SECTION A
ES-800-06	BUILDING ELEVATION - SECTION B
ES-800-07	BUILDING ELEVATION - SECTION C
ES-800-08	PRE-TREATMENT FACILITY COLD CHEMICAL SUPPLY AREA
ES-800-09	PRE-TREATMENT FACILITY CELL EQUIPMENT ARRANGEMENT

- NOTES:
- FOR OVERALL DIMENSIONS SEE 64.04.
 - BOOTHING SPACE EQUIPMENT INCLUDE:
 - 1. COLD CHEMICAL LAB IN CHEMICAL AREA - 300 SQ. FT.
 - 2. HIGH-TEMP. - 5000 SQ. FT.
 - HVAC REQUIREMENT BASED ON ORIGINAL SPACE.
 - HVAC ZONING & ROOMS AS RE-CONSTRUCTED.

STAND ALONE

PLAN VIEW #1 (-130'-0")



EQUIPMENT LIST	
1. WASTE STORAGE	22. WASTE RECEIVING
2. WASTE RECEIVING	23. WASTE TREATMENT
3. WASTE TREATMENT	24. WASTE DISPOSAL
4. WASTE DISPOSAL	25. WASTE INCINERATION
5. WASTE INCINERATION	26. WASTE LANDFILL
6. WASTE LANDFILL	27. WASTE OCEAN DUMPING
7. WASTE OCEAN DUMPING	28. WASTE TREATMENT PLANT
8. WASTE TREATMENT PLANT	29. WASTE TREATMENT FACILITY
9. WASTE TREATMENT SYSTEM	30. WASTE TREATMENT PROCESS
10. WASTE TREATMENT PROCESS	31. WASTE TREATMENT EQUIPMENT
11. WASTE TREATMENT MATERIALS	32. WASTE TREATMENT SUPPLIES
12. WASTE TREATMENT SERVICES	33. WASTE TREATMENT CONTRACTORS
13. WASTE TREATMENT CONSULTANTS	34. WASTE TREATMENT ENGINEERS
14. WASTE TREATMENT ARCHITECTS	35. WASTE TREATMENT PLANNERS
15. WASTE TREATMENT DESIGNERS	36. WASTE TREATMENT CONSTRUCTORS
16. WASTE TREATMENT OPERATORS	37. WASTE TREATMENT MAINTENANCE
17. WASTE TREATMENT INSPECTION	38. WASTE TREATMENT AUDIT
18. WASTE TREATMENT COMPLIANCE	39. WASTE TREATMENT REPORTING
19. WASTE TREATMENT RECORDS	40. WASTE TREATMENT MONITORING
20. WASTE TREATMENT EVALUATION	41. WASTE TREATMENT IMPROVEMENT
21. WASTE TREATMENT INNOVATION	42. WASTE TREATMENT RESEARCH

10 PRELIMINARY

NOT APPROVED FOR CONSTRUCTION

U.S. DEPARTMENT OF ENERGY
NORTH CAROLINA OPERATIONS OFFICE

PRE-TREATMENT FACILITY
PLAN (-130'-0")

ES-800-01

SK-100 11110

[illegible]

STAND ALONE

PRELIMINARY

NOT APPROVED FOR CONSTRUCTION

APPROVAL	DATE	U.S. DEPARTMENT OF ENERGY RICHLAND OPERATIONS OFFICE
----------	------	---

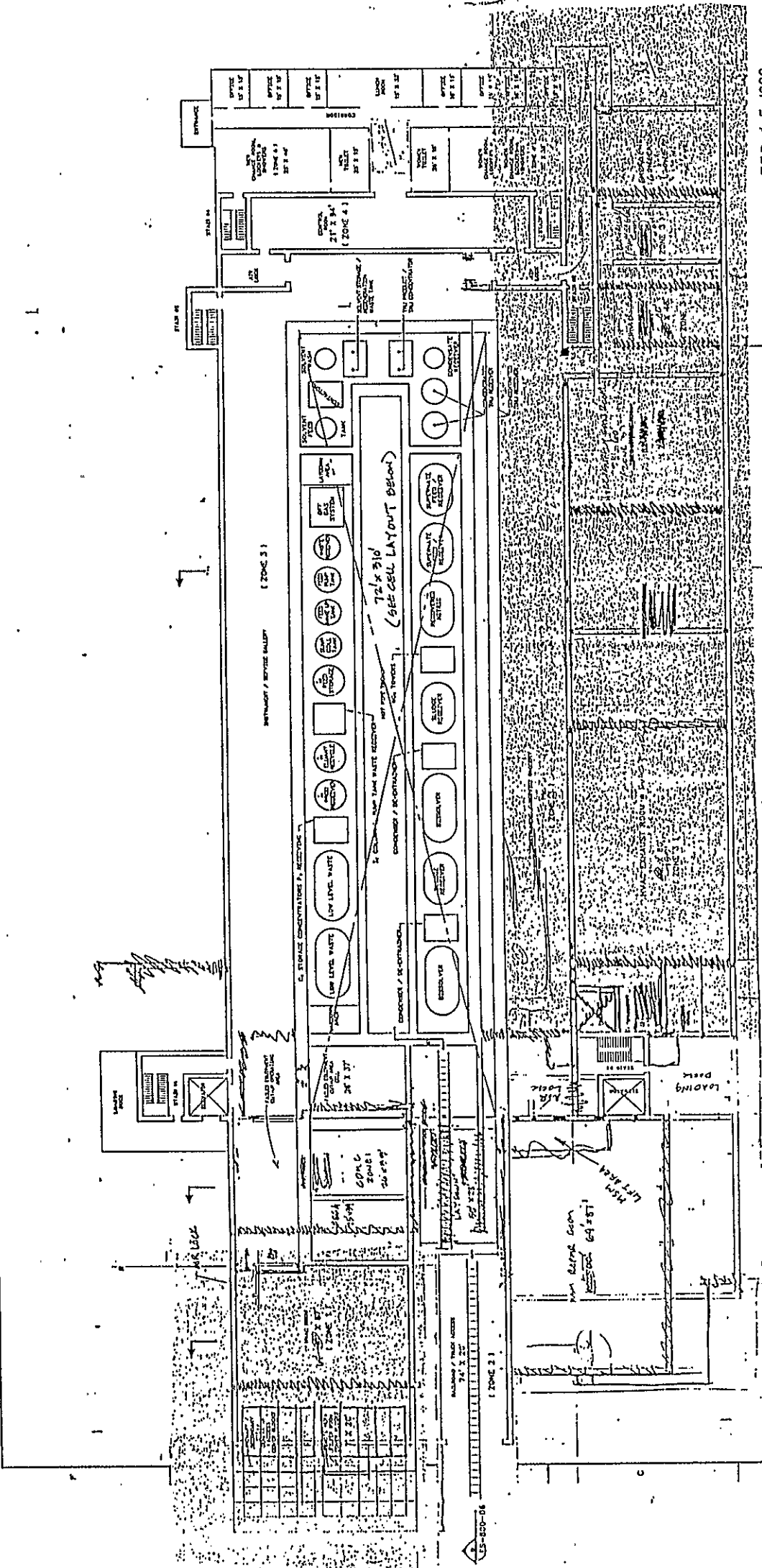
PRE-TREATMENT
FACILITY
PLAN (-)13'-0"

MMVA PRE-TREATMENT FACILITY

NAME	AGE	SEX	REL	STATUS	REMARKS
SK-101	1	1			

DRAWING LIST		REVISIONS		FACILITY PLAN (-113'-0")	
NUMBER	TITLE	DATE	BY	DESCRIPTION	REV
1	REFERENCES				
2	NEXT WORK ON				

91121713



FEB 15 1989

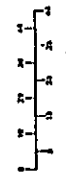
STAND ALONE

PRELIMINARY

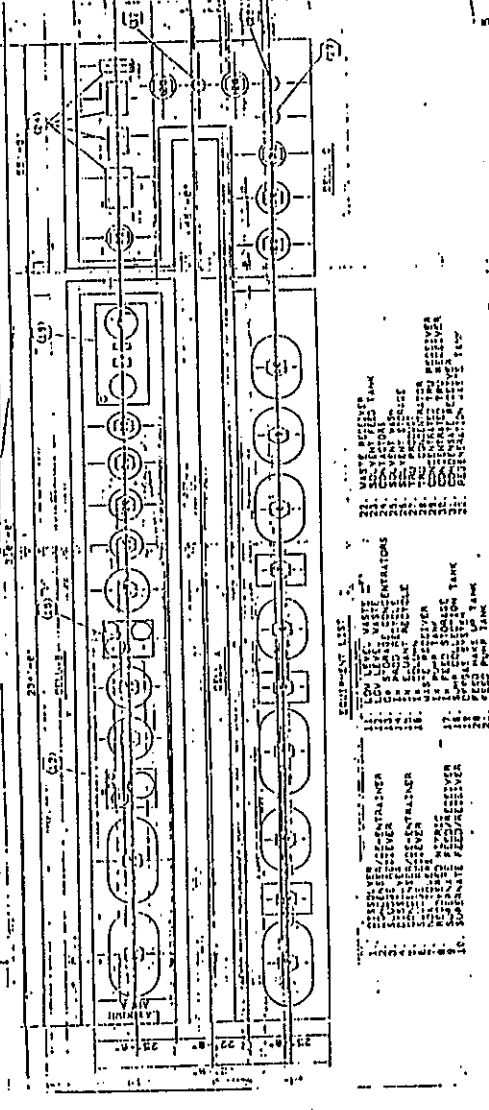
NOT APPROVED FOR CONSTRUCTION
U.S. DEPARTMENT OF ENERGY
Nuclear Energy Research and Development
Office of Environmental Management

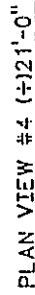
PRE-TREATMENT
FACILITY
PLAN (+) 4'-0"

NO.	DESCRIPTION	DATE	BY	CHKD.
1	DESIGN	12-1-88	J. L. BROWN	J. L. BROWN
2	REVISION	12-1-88	J. L. BROWN	J. L. BROWN
3	REVISION	12-1-88	J. L. BROWN	J. L. BROWN
4	REVISION	12-1-88	J. L. BROWN	J. L. BROWN
5	REVISION	12-1-88	J. L. BROWN	J. L. BROWN
6	REVISION	12-1-88	J. L. BROWN	J. L. BROWN
7	REVISION	12-1-88	J. L. BROWN	J. L. BROWN
8	REVISION	12-1-88	J. L. BROWN	J. L. BROWN
9	REVISION	12-1-88	J. L. BROWN	J. L. BROWN
10	REVISION	12-1-88	J. L. BROWN	J. L. BROWN



(+) 4'-0"





STAND ALONE

PRELIMINARY

NOT APPROVED FOR CONSTRUCTION

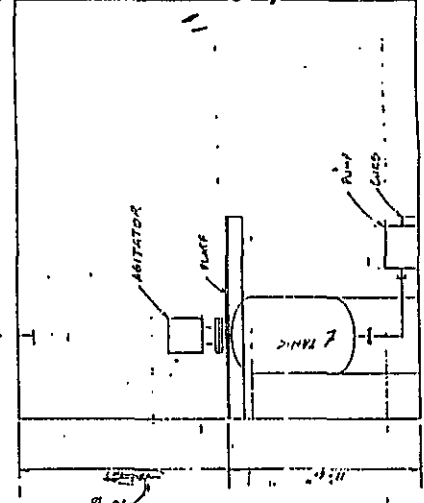
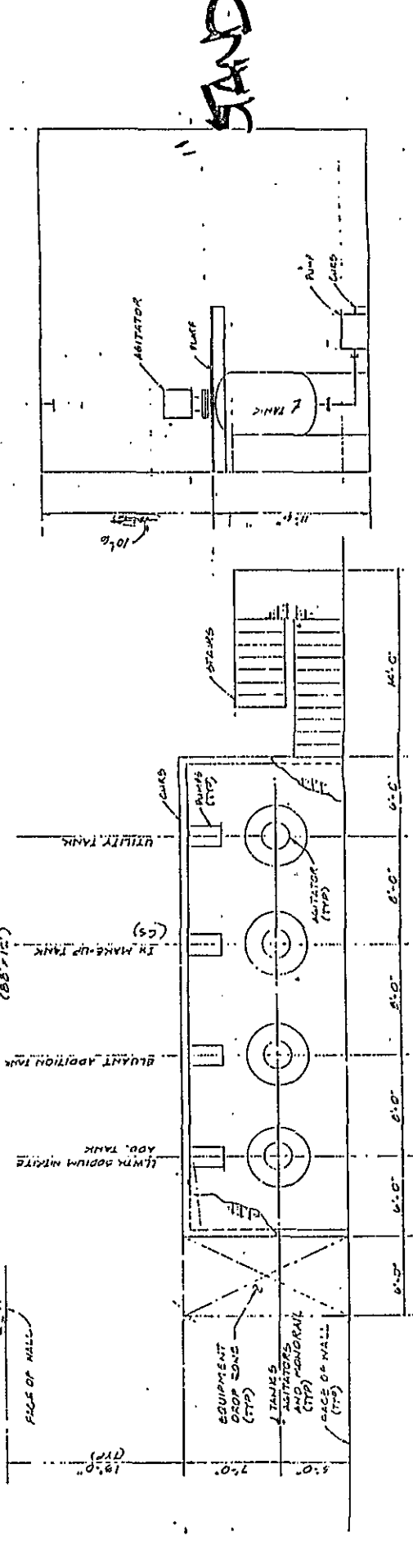
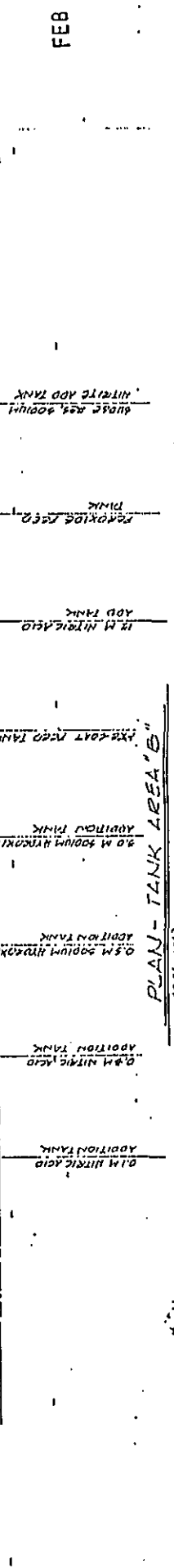
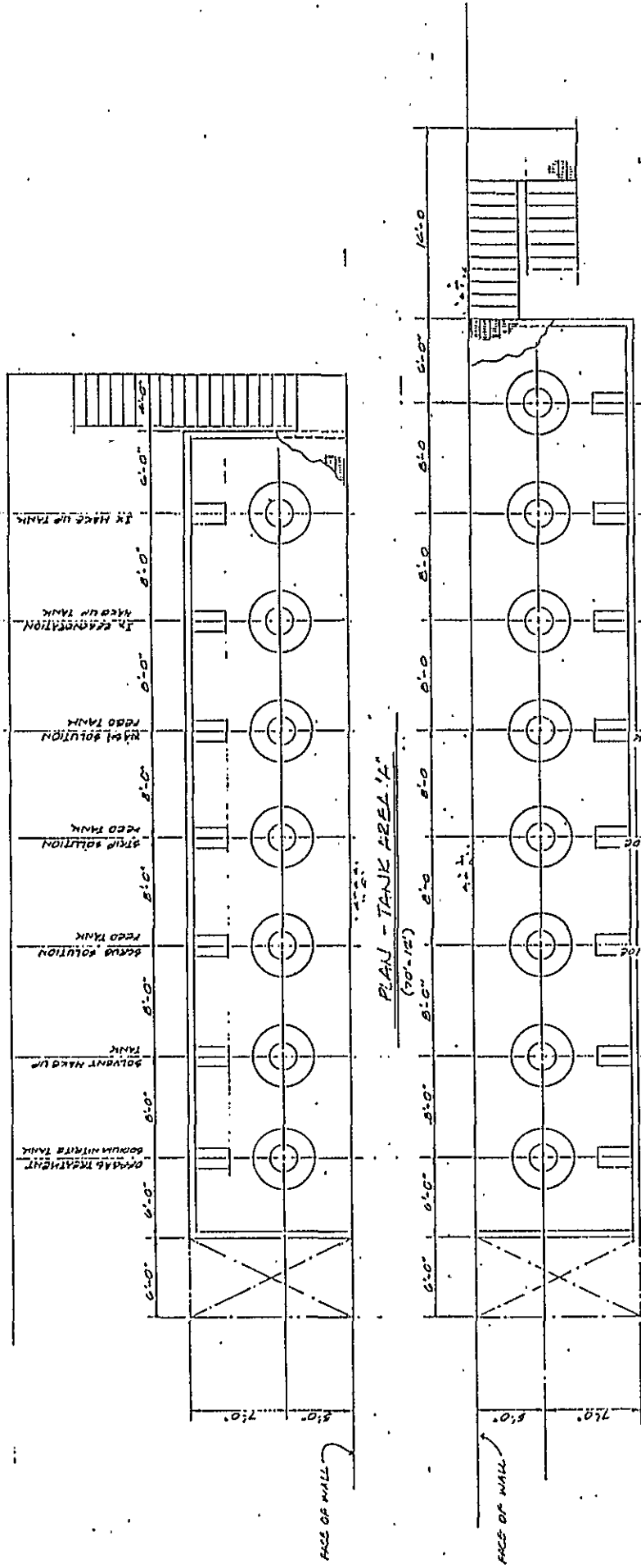
PRE-TREATMENT
FACILITY
PLAN (+) 21'-0"

NEW PRE-TREATMENT FACILITY

[illegible]

SK-103 11110

025420000
1
2 01/18/76



FEB 15 1989

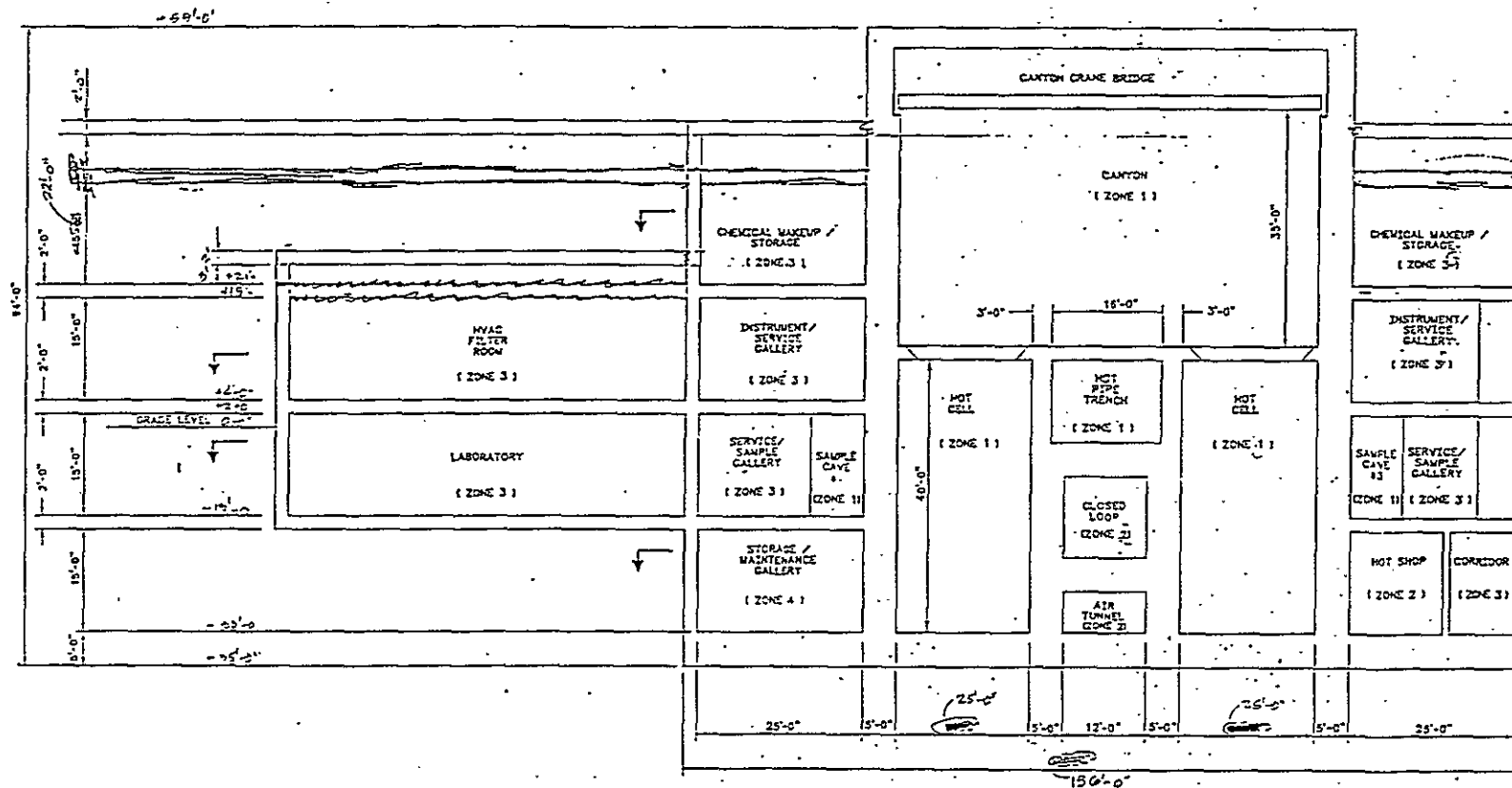
SANDSTONE

TYPICAL SECTION

PLAN - TANK AREA "C"

SK-104

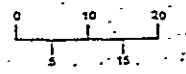
0110101015



BUILDING ELEVATION - SECTION A
SCALE: 1/8"=1'-0"

FEB 15 1989

STAND ALONE



7 PRELIMINARY

NOT APPROVED FOR CONSTRUCTION

U.S. DEPARTMENT OF ENERGY
RICHLAND OPERATIONS OFFICE

PRE-TREATMENT
FACILITY
ELEVATION A

HWPP PRE-TREATMENT FACILITY

DATE: 1/11/89 ELEVATION: 244820

BY: SA CRESS

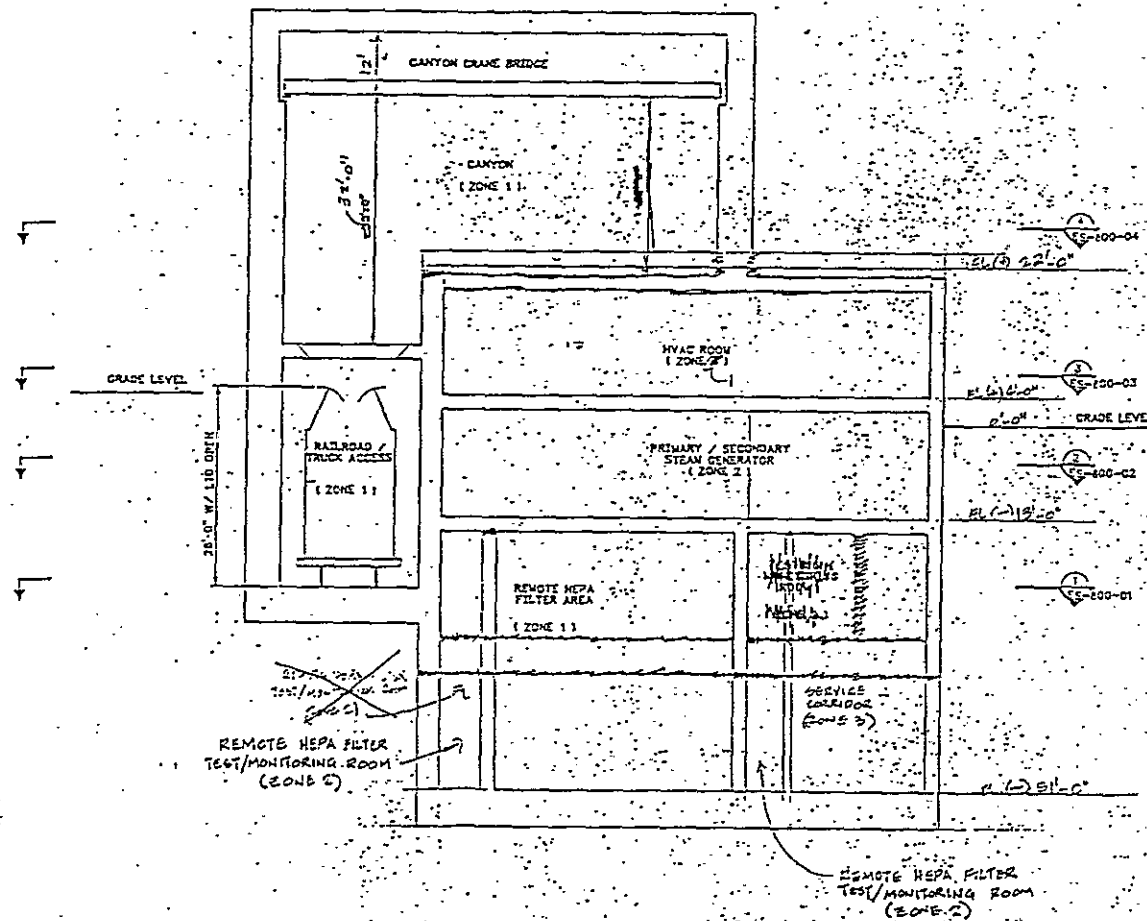
BY: AD CAMPBELL

SK-105

11110

NUMBER	TITLE	DATE	BY	DESCRIPTION	REVISIONS
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2	REFERENCE				
3	NEXT USED ON				

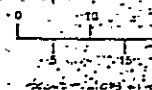
911211317



BUILDING ELEVATION - SECTION C
SCALE: 1/4"=1'-0"

FEB 15 1989

STAND ALONE



PRELIMINARY

NOT APPROVED FOR CONSTRUCTION

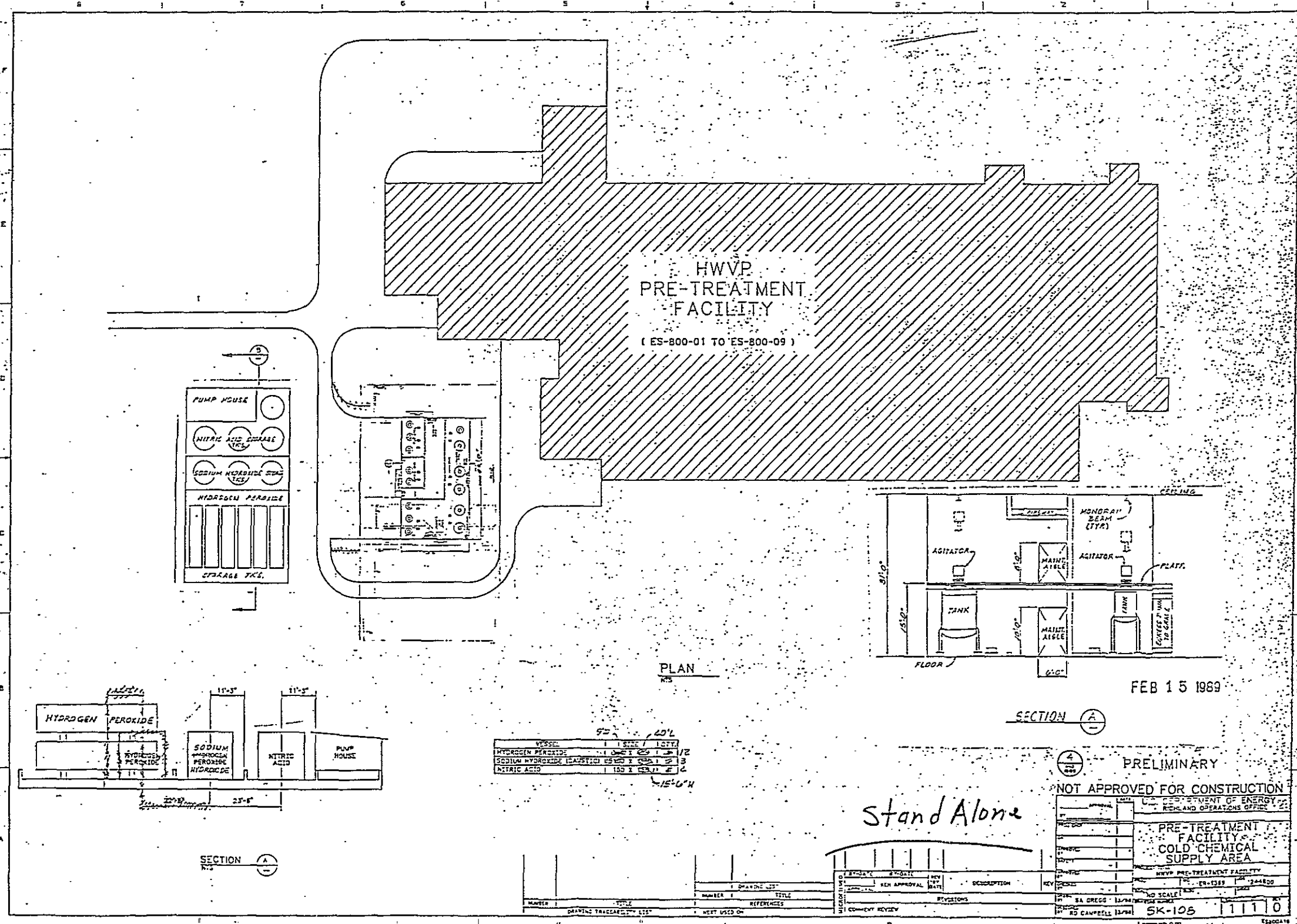
U.S. DEPARTMENT OF ENERGY
RICHMOND OPERATIONS OFFICE

PRE-TREATMENT
FACILITY
ELEVATION C

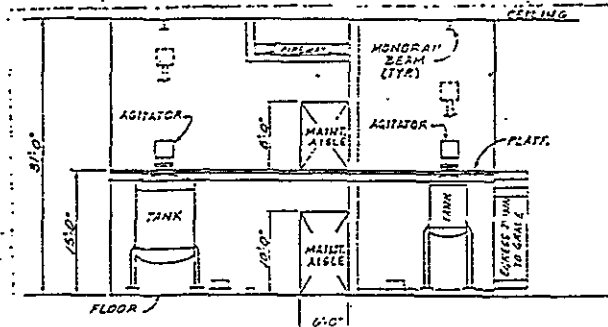
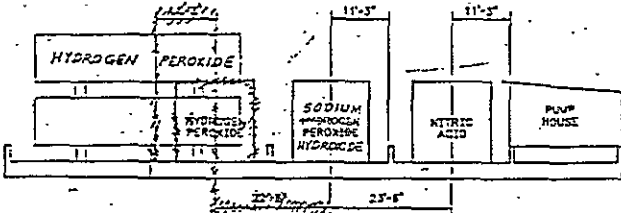
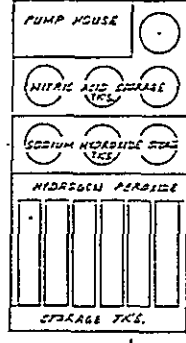
NO.	DATE	BY	CHKD.	REV.	DESCRIPTION
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2	12/1/88	W. GREGG	W. GREGG	2	REVISED
3	12/1/88	W. GREGG	W. GREGG	3	REVISED
4	12/1/88	W. GREGG	W. GREGG	4	REVISED
5	12/1/88	W. GREGG	W. GREGG	5	REVISED
6	12/1/88	W. GREGG	W. GREGG	6	REVISED
7	12/1/88	W. GREGG	W. GREGG	7	REVISED
8	12/1/88	W. GREGG	W. GREGG	8	REVISED
9	12/1/88	W. GREGG	W. GREGG	9	REVISED
10	12/1/88	W. GREGG	W. GREGG	10	REVISED

SK-107 11110

911211318



HWVP
PRE-TREATMENT
FACILITY
(ES-800-01 TO ES-800-09)



VESSEL	SIZE	QTY	MATERIAL	VOLUME
HYDROGEN PEROXIDE	1 1/2	1	304 SS	1 1/2
SODIUM HYDROXIDE (CAUSTIC)	1 1/2	1	304 SS	1 1/2
NITRIC ACID	1 1/2	1	304 SS	1 1/2

FEB 15 1989

SECTION A

PRELIMINARY

NOT APPROVED FOR CONSTRUCTION

Stand Alone

PRE-TREATMENT
FACILITY
COLD CHEMICAL
SUPPLY AREA

HWVP PRE-TREATMENT FACILITY

NO SCALE

SK-105 11110

APPENDIX G

CILITY DRAWING INTEGRATED ALTERNATIVE

FACILITY DRAWINGS

INTEGRATED

ALTERNATIVE

Diagram illustrating the layout of chemical storage tanks and equipment:

- Tanks labeled: HYDROGEN PEROXIDE, SODIUM HYDROXIDE, NITRIC ACID, and PUMP HOUSE.
- Dimensions shown: 11'-0" (height of tanks), 11'-0" (width of tanks), and 25'-0" (total width).


SECTION

FEB 15 1989

NOTE:
SUPERDATE RECEIVER TANKS LOCATED OUTSIDE BUILDING

INTEGRATED

VIT. B12 708-5

 PRELIMINARY

NOT APPROVED FOR CONSTRUCTION

U.S. DEPARTMENT OF ENERGY
RICHLAND OPERATIONS OFFICE

HWVP
PRE-TREATMENT
BLDG MODIFICATIONS

NHW PRE-TREATMENT FACILITY			
NAME	NO	ER-1385	244800
NAME	NO	1000	
STATION NO.			
NO	SK-200		
NO			

NOTES

1. PROPORTION REQUIREMENTS AS FOLLOWS

A. ROOMS/M MSM REPAIR BUDGETS OF (2000 SQ FT)

3. PROPORTION NON-REPAIR MINS. 2800 SQ FT

4. A 4 COLD CUM. LMS IN SERVICE 300 GRT

D. CRANE MAINTENANCE AREA AT 50% END OF VIT. BLOC TO BE EXTEND 20'

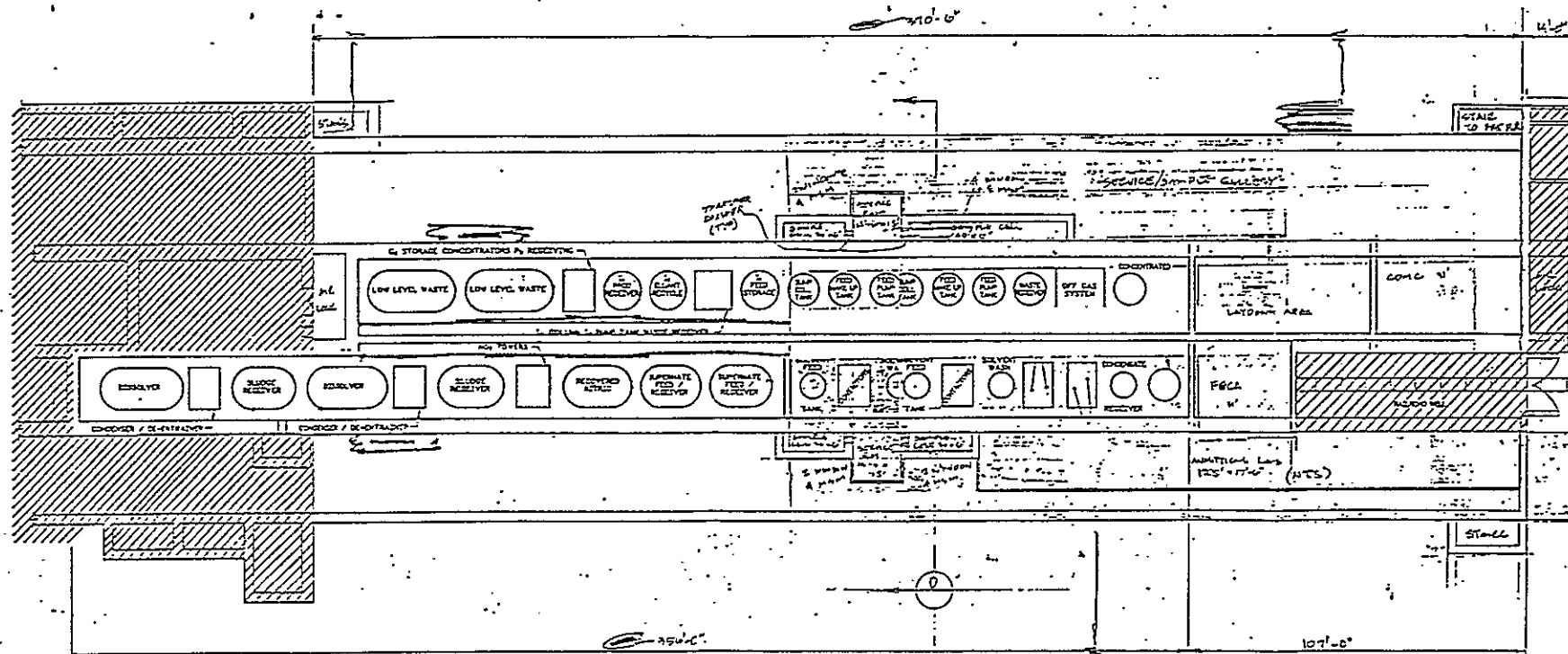
2. INAC REQUIREMENT NOT ON DIALS

— ADDITION TO EXISTING SERVICE BLDG (HWY)
E GRADE

DATE	ST-201	ST-202	REV DATE	DESCRIPTION
	APPROVAL	EDN APPROVAL		
REVISIONS				

NAME	SA CRIGG	12/88	INVEST	6X-200
DATE	12/88			
TIME				
BY				
REMARKS				

91121201021



FEB 15 1989

NOTE:
SUPERMATE RECEIVER TANKS LOCATED OUTSIDE BUILDING

PLAN A

"INTEGRATE"

VIT. BLDG - 2 723'-0"

PRELIMINARY

EXISTING HWVP SCOPE

NOT APPROVED FOR CONSTRUCTION

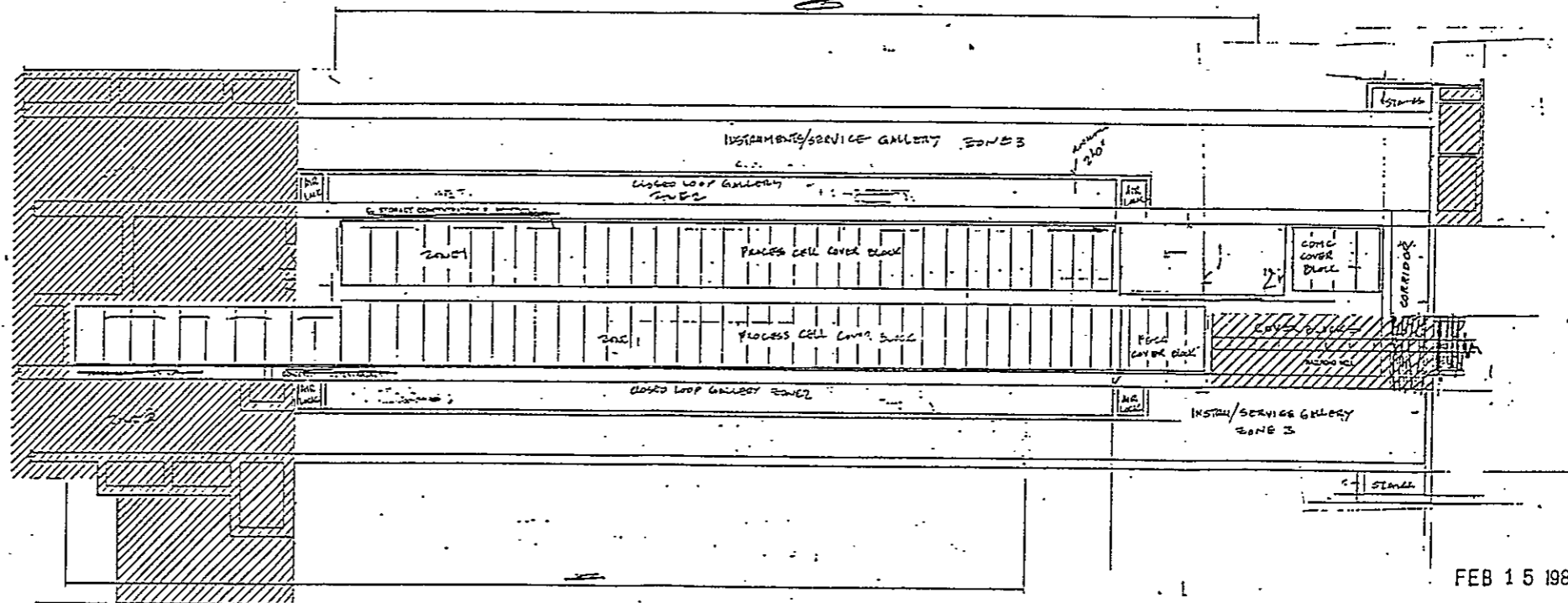
U.S. DEPARTMENT OF ENERGY
MIDLAND OPERATIONS OFFICE

HWVP
PRE-TREATMENT
BLDG MODIFICATIONS

NO.	DATE	DESCRIPTION	BY	CHKD
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3	12/1/88	REVISION	SA CRESS	SA CRESS
4	12/1/88	REVISION	SA CRESS	SA CRESS
5	12/1/88	REVISION	SA CRESS	SA CRESS
6	12/1/88	REVISION	SA CRESS	SA CRESS
7	12/1/88	REVISION	SA CRESS	SA CRESS
8	12/1/88	REVISION	SA CRESS	SA CRESS
9	12/1/88	REVISION	SA CRESS	SA CRESS
10	12/1/88	REVISION	SA CRESS	SA CRESS

SK-201 1110

9112131322



FEB 15 1989

NOTE:
SUPERHATE RECEIVER TANKS LOCATED OUTSIDE BUILDING

INTERGRATED

PLAN A

EXISTING HWVP SCOPE

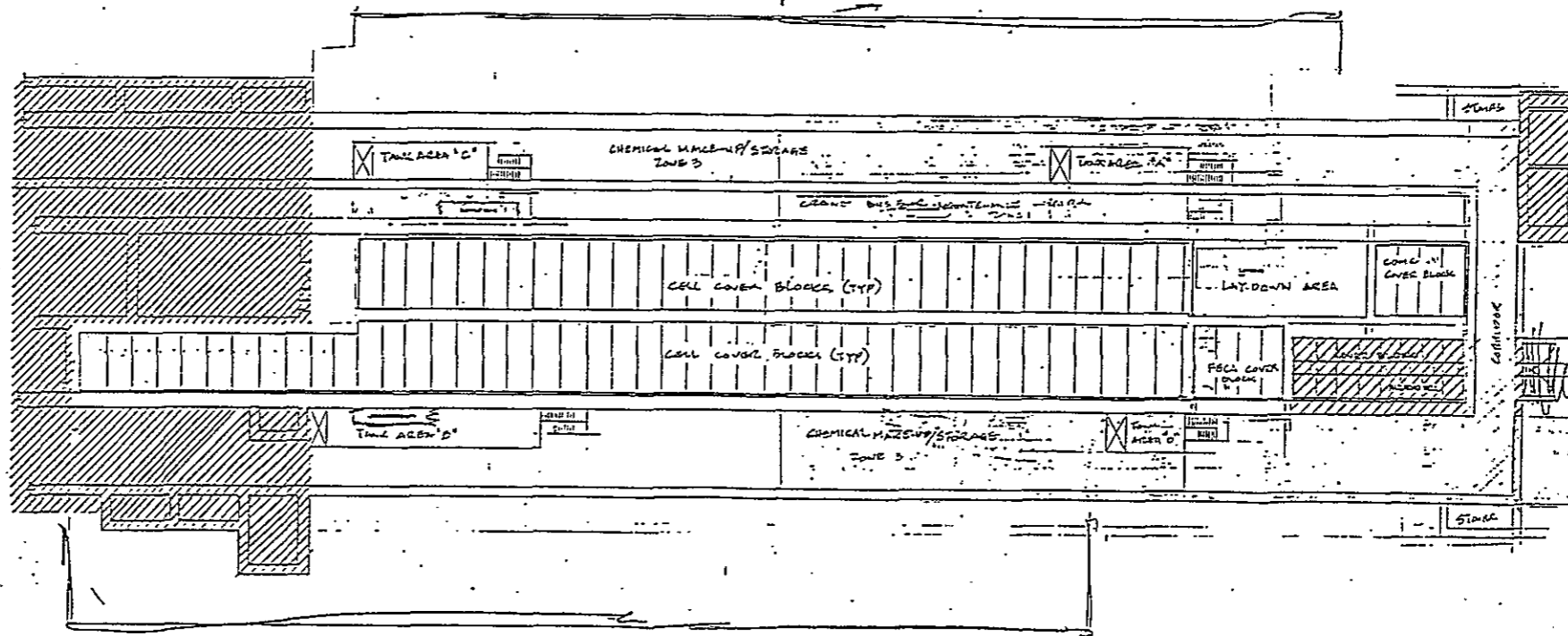
PRELIMINARY	
VIT. BLDG. E. 738'-6"	
NOT APPROVED FOR CONSTRUCTION	
U.S. DEPARTMENT OF ENERGY MIDLAND OPERATIONS OFFICE	
HWVP PRE-TREATMENT BLDG MODIFICATIONS	
HWVP PRE-TREATMENT FACILITY	
ER-1349 244800	
SA CRESS 2/24/89	
RD CAMPBELL 12/88	
SK-202 11110	

NO.	DATE	BY	DESCRIPTION
1	2/15/89	SA CRESS	PRELIMINARY
2	2/24/89	RD CAMPBELL	REVISION

NO.	DATE	BY	DESCRIPTION
1	2/15/89	SA CRESS	PRELIMINARY
2	2/24/89	RD CAMPBELL	REVISION

NO.	DATE	BY	DESCRIPTION
1	2/15/89	SA CRESS	PRELIMINARY
2	2/24/89	RD CAMPBELL	REVISION

9112101323



FEB 15 1989

NOTE:
SUPERNATE RECEIVER TANKS LOCATED OUTSIDE BUILDING

"INTEGRATED"
VIT. BLDG EL. 75'-0"

 PRELIMINARY

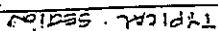
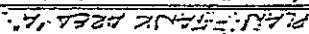
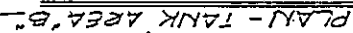
PLAN A

EXISTING HWVP SCOPE 

NOT APPROVED FOR CONSTRUCTION

U.S. DEPARTMENT OF ENERGY HIGHLAND OPERATIONS OFFICE	
HWVP PRE-TREATMENT BLDG MODIFICATIONS	
HWVP PRE-TREATMENT FACILITY	
PROJECT NO.	244800
DATE	02-15-89
BY	SA GREGG
BY	AD CAMPBELL
SK-203	11110

REVISIONS	DESCRIPTION	DATE	BY	APP'D
1	ISSUED FOR CONSTRUCTION	02-15-89	SA GREGG	
2	REVISED			
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FE8 1 5 1989

Architectural floor plan of the 1st floor of the Service Building. The plan shows a large central area labeled "PROCESS CANYON" with "CONCRETE MATCH COVERS". To the left is "STAIR NO 5" and an "OPERATING GALLERY". Above the canyon is an "HVAC EQUIPMENT ROOM" and "METAL SIDING". The plan includes various rooms, corridors, and structural details. Elevations and dimensions are provided throughout. A "VOID" is indicated at the bottom left. The plan is marked with grid lines X, Y, T, R, Q, P, M, L, K, J, I, H, G, F, E, D, C, B, A.

"INTEGRATED

3

--2-118021, 023, 027
029, 031, 4 034

NOTE:

1. FOR GENERAL NOTES AND LEGEND SEE DRAWING M-2-117231

[illegible]

APPENDIX H

FACILITY DRAWINGS CO-LOCATED ALTERNATIVE

9 1 1 2 1 1 2 2 6

9. THIS SCHEME BASED ON KSTAND MODEL
AND MODIFIED AS NOTED - WHITE
PAGE-UP'S

Technical drawing of a mechanical assembly, likely a pump or engine component. The drawing includes a side view (top) and a cross-section view (bottom). Dimensions are provided in inches.

Top View (Side View):

- Overall length: 32" - 0"
- Overall width: 12" - 0"
- Internal width: 10" - 0"
- Internal length: 28" - 0"
- Internal width: 8" - 0"
- Internal length: 24" - 0"
- Internal width: 6" - 0"
- Internal length: 20" - 0"
- Internal width: 4" - 0"
- Internal length: 16" - 0"
- Internal width: 2" - 0"
- Internal length: 12" - 0"
- Internal width: 0" - 0"

Bottom View (Cross-section View):

- Overall length: 32" - 0"
- Overall width: 12" - 0"
- Internal width: 10" - 0"
- Internal length: 28" - 0"
- Internal width: 8" - 0"
- Internal length: 24" - 0"
- Internal width: 6" - 0"
- Internal length: 20" - 0"
- Internal width: 4" - 0"
- Internal length: 16" - 0"
- Internal width: 2" - 0"
- Internal length: 12" - 0"
- Internal width: 0" - 0"

The drawing shows a series of internal components, possibly pistons or valves, arranged in a row. The components are labeled with numbers 1 through 12. The drawing is a technical drawing, likely a blueprint, showing the internal structure of a mechanical component. The drawing is oriented horizontally, with the top view at the top and the cross-section view at the bottom. The drawing includes dimensions for length and width, and labels for the internal components. The drawing is a technical drawing, likely a blueprint, showing the internal structure of a mechanical component. The drawing is oriented horizontally, with the top view at the top and the cross-section view at the bottom. The drawing includes dimensions for length and width, and labels for the internal components.

CO-FACILITY
AS DISCOVERED
~~STAND ALONE~~

1-0 [unclear] [unclear]

1. DISSOLVER
2. CONDENSER/DE-ENTRAINER
3. SLUDGE RECEIVER
4. DISSOLVER
5. CONDENSER/DE-ENTRAINER
6. SLUDGE RECEIVER
7. NOX TOWERS
8. RECOVERED NITRIC
9. SUPERNATE FEED/RECEIVER
10. SUPERNATE FEED/RECEIVER

```

11. LOW LEVEL WASTE
12. LOW LEVEL WASTE
13. CO STORAGE CONCENTRATOR
14. IN BRCK RECYCLE
15. IN ELUANT RECYCLE
16. IN COLUMN
    WASTE RECEIVER
    IN PUMP TANK
17. IN FEED STORAGE
18. SUMP COLLECTION TANK
19. OFFGAS SYSTEM
20. FEED MAKE UP TANK
21. FEED PUMP TANK

```

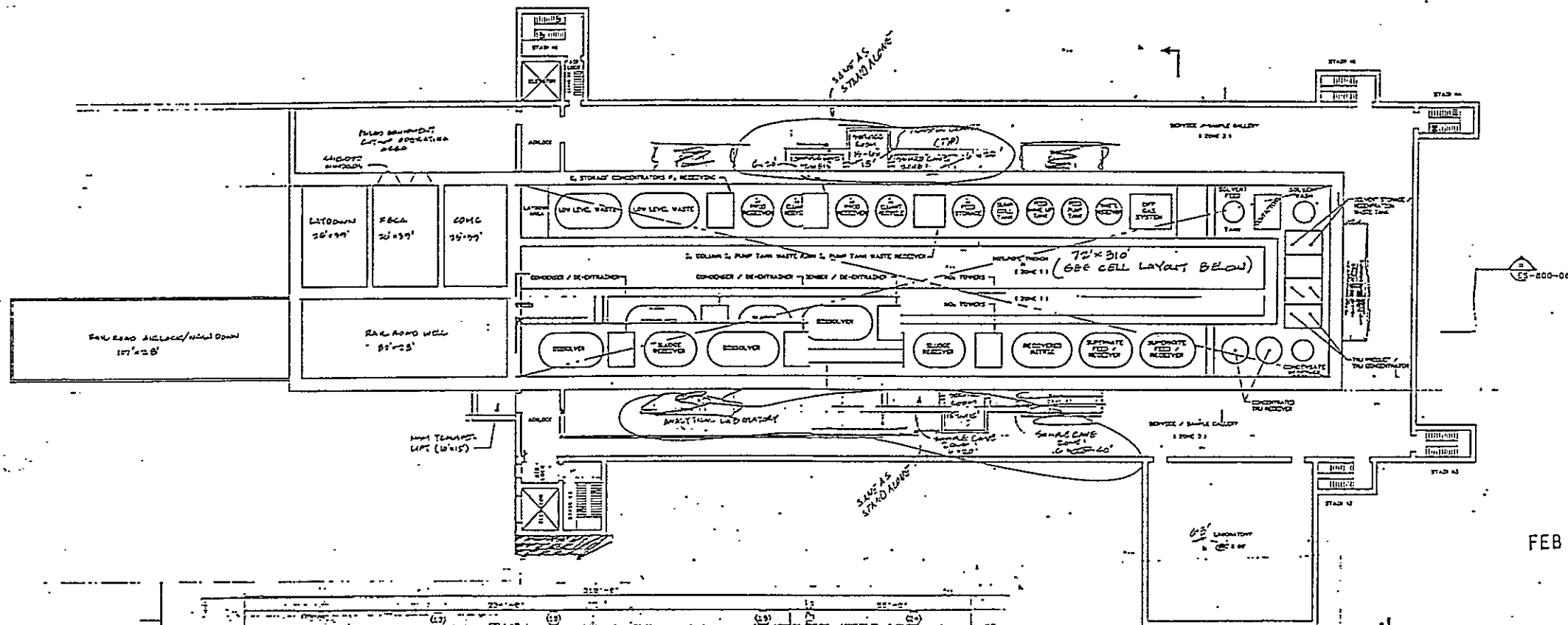
22. WASTE RECEIVER
23. SOLVENT FEED TANK
24. CONTACTORS
25. SOLVENT WASH
26. SOLVENT STORAGE
27. TRU PRODUCT
28. TRU CONCENTRATOR
29. CONCENTRATED TRU RECEIVER
30. CONCENTRATED TRU RECEIVER
31. CONDENSATE RECEIVER
32. REGENERATION WASTE TANK

NUMBER	TITLE
1	REFERENCES
1	REF. USED ON

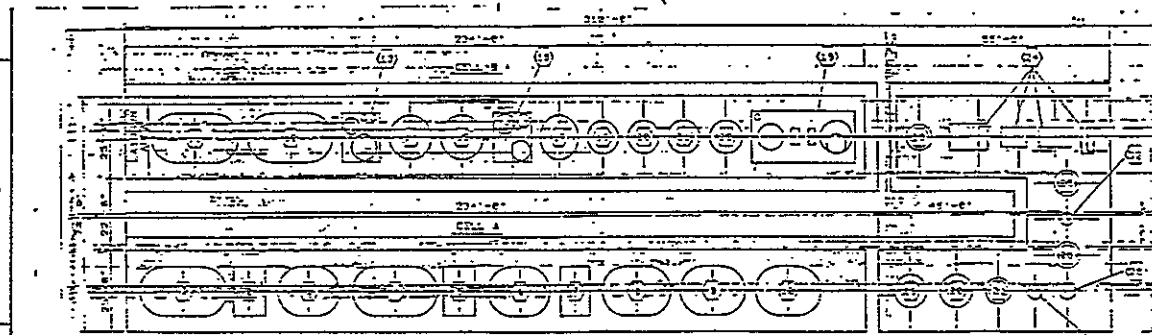
RE
COMMENT REVIEW

SA GREGG 12/80
SK-300

91121323



FEB 15 1989



EQUIPMENT LIST

- | | |
|-------------------------|-----------------------|
| 1. LOW LEVEL WASTE | 21. WASTE RECEIVER |
| 2. LOW LEVEL WASTE | 22. SOLVENT FEED TANK |
| 3. LOW LEVEL WASTE | 23. SOLVENT FEED TANK |
| 4. STORAGE CONCENTRATOR | 24. SOLVENT VAS |
| 5. 14 PROD RECYCLE | 25. SOLVENT STORAGE |
| 6. 14 ELUANT RECYCLE | 26. TSP PRODUCE |
| 7. 14 PROD RECYCLE | 27. TSP PRODUCE |
| 8. 14 PROD RECYCLE | 28. TSP PRODUCE |
| 9. 14 PROD RECYCLE | 29. TSP PRODUCE |
| 10. 14 PROD RECYCLE | 30. TSP PRODUCE |
| 11. 14 PROD RECYCLE | 31. TSP PRODUCE |
| 12. 14 PROD RECYCLE | 32. TSP PRODUCE |
| 13. 14 PROD RECYCLE | 33. TSP PRODUCE |
| 14. 14 PROD RECYCLE | 34. TSP PRODUCE |
| 15. 14 PROD RECYCLE | 35. TSP PRODUCE |
| 16. 14 PROD RECYCLE | 36. TSP PRODUCE |
| 17. 14 PROD RECYCLE | 37. TSP PRODUCE |
| 18. 14 PROD RECYCLE | 38. TSP PRODUCE |
| 19. 14 PROD RECYCLE | 39. TSP PRODUCE |
| 20. 14 PROD RECYCLE | 40. TSP PRODUCE |

~~STANDARD~~
CO-FACILITY

PRELIMINARY
NOT APPROVED FOR CONSTRUCTION
U.S. DEPARTMENT OF ENERGY
RICHLAND OPERATIONS OFFICE
PRE-TREATMENT FACILITY
PLAN (-)113'-0"

NO.	DATE	BY	DESCRIPTION	REV.
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9112111330

~~CO-FACILITY~~
~~STAND ALONE~~

NOT APPROVED FOR CONSTRUCTION
PRELIMINARY

U.S. DEPARTMENT OF ENERGY
HAWAIIAN OPERATIONS OFFICE

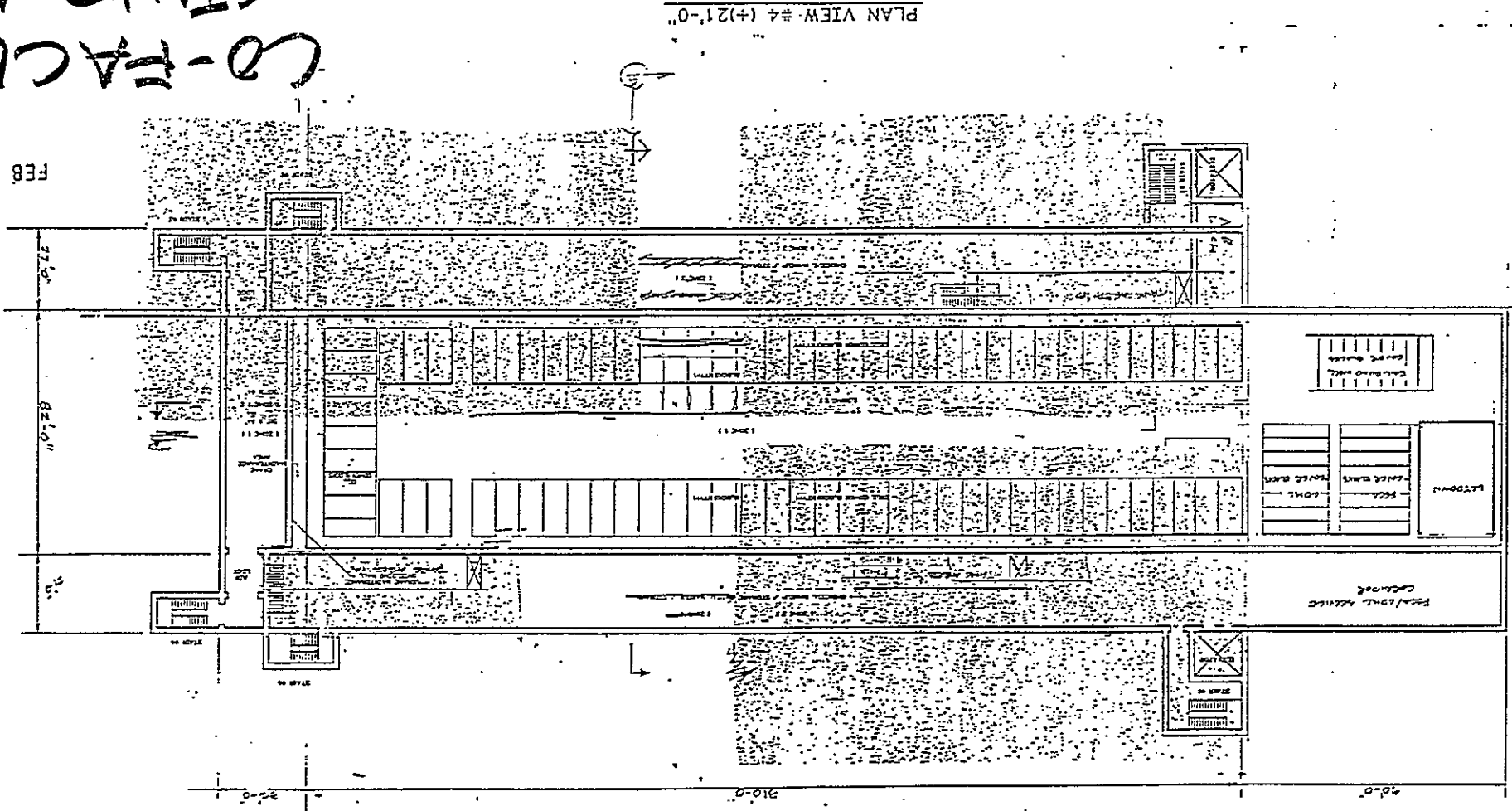
PRE-TREATMENT
FACILITY
PLAN (+)21'-0"

NO CAMPUS/STAND ALONE

SK-203 1110

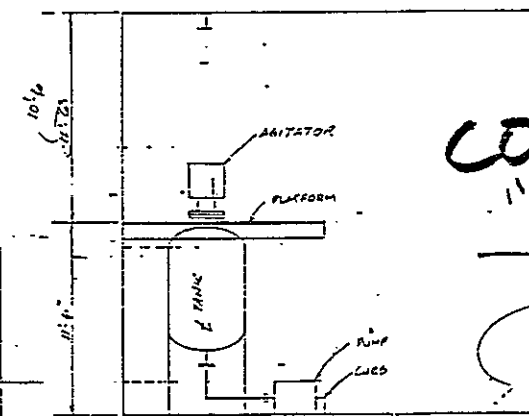
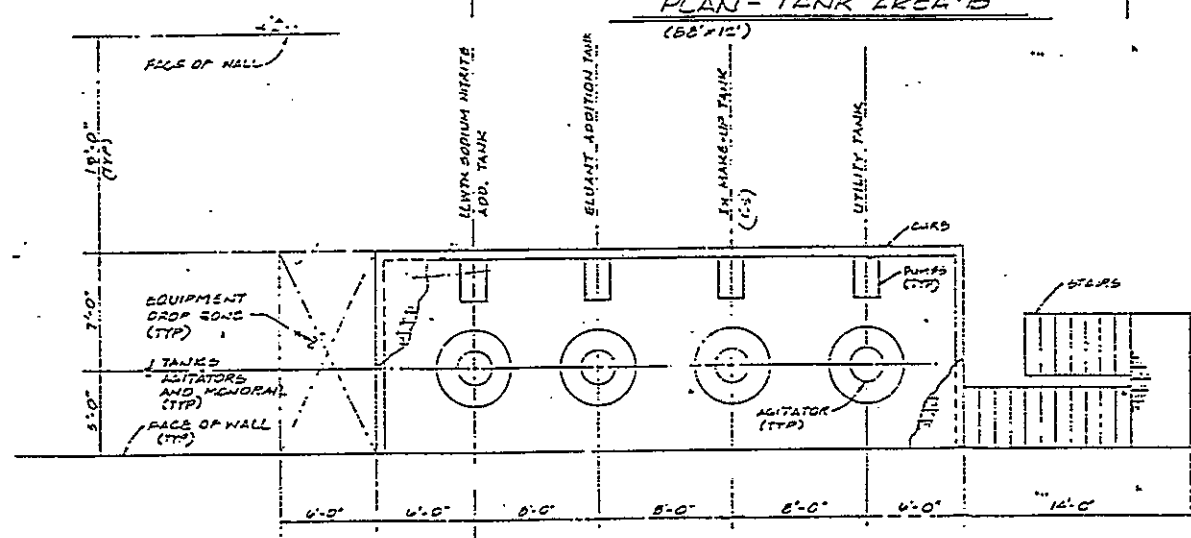
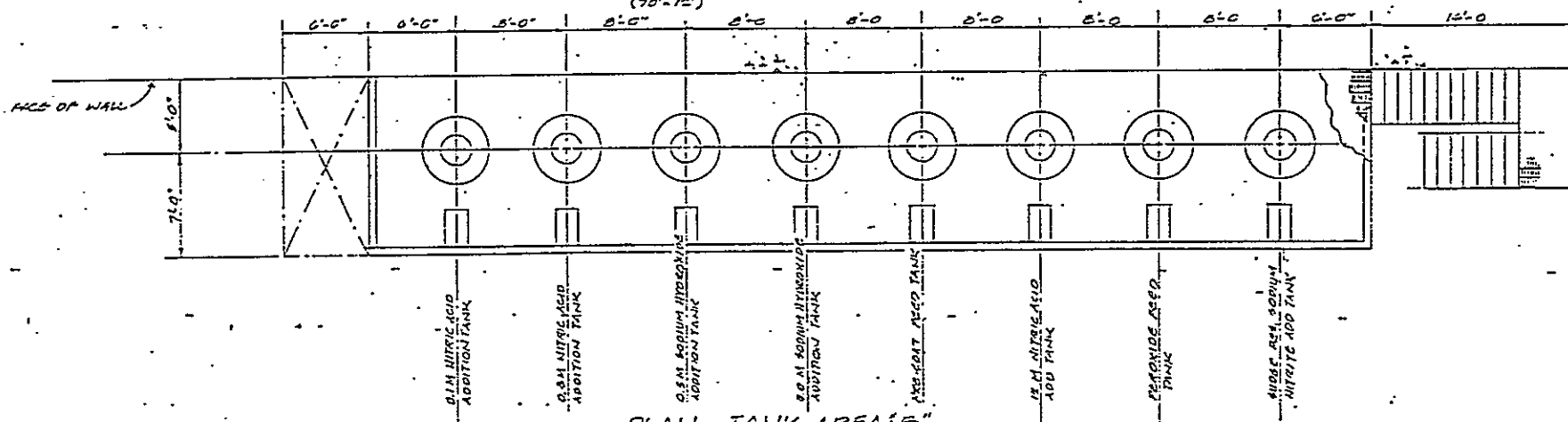
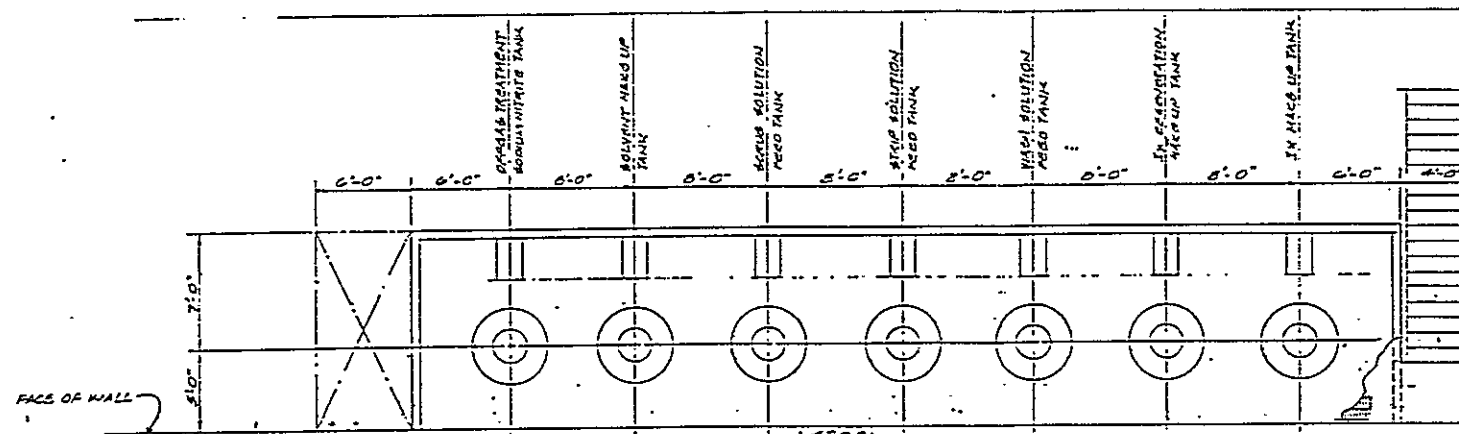
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10	REVISION		

NO.	DESCRIPTION	DATE	BY
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10	REVISION		



FEB 15 1989

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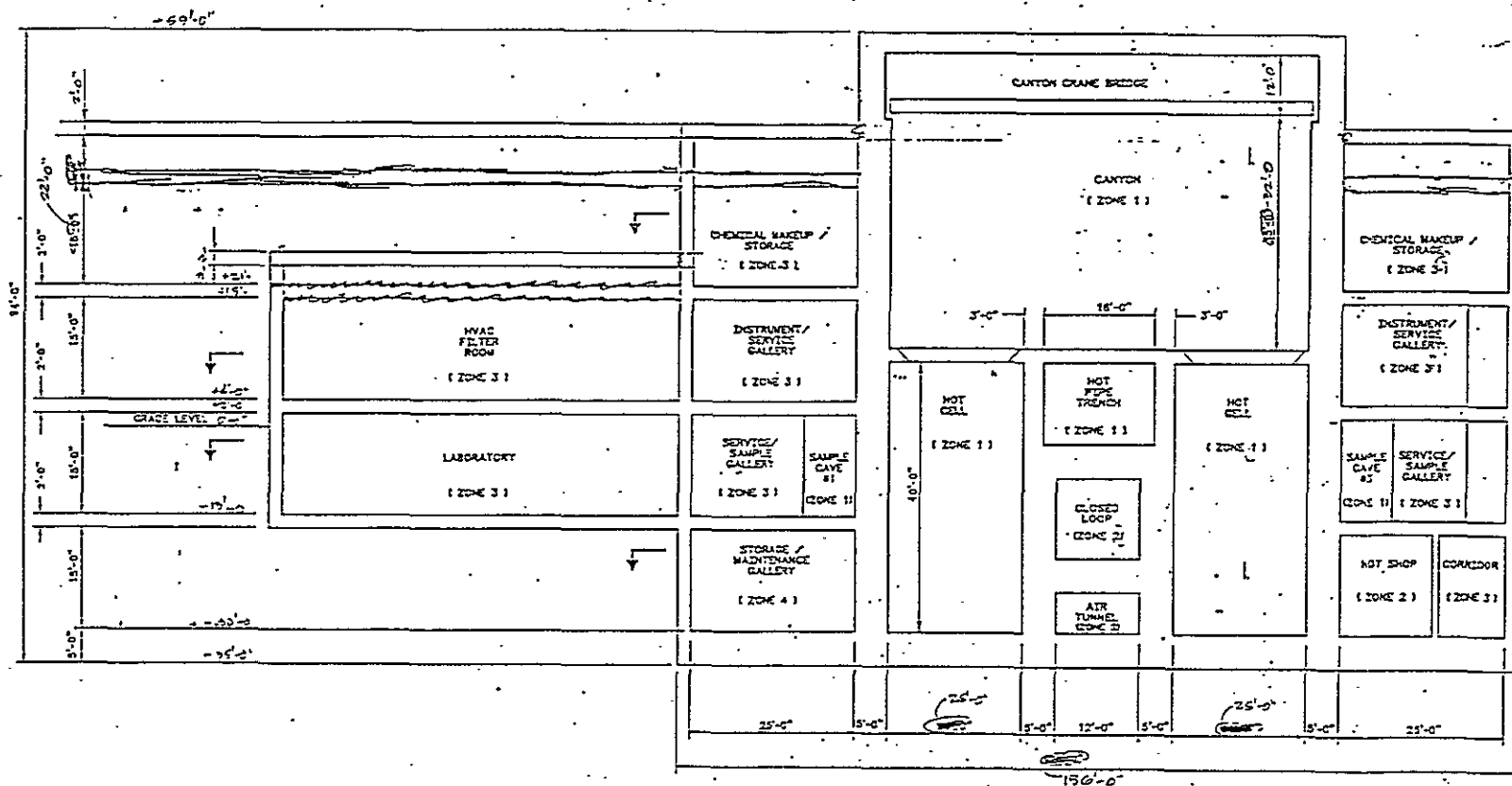


CO-FACILITY
STAND ALONE

THIS DWS ONLY -
NO CHANGE FROM
"STAND ALONE"

FEB 15 1989

91121 1032



FEB 15 1989

THIS Dwg ONLY
NO CHANGES FROM
"STAND ALONE"
STAND ALONE

BUILDING ELEVATION - SECTION A
SCALE: 1/4"=1'-0"

CO-FACILITY
PRELIMINARY

NOT APPROVED FOR CONSTRUCTION

U.S. DEPARTMENT OF ENERGY
RICHMOND OPERATIONS OFFICE

PRE-TREATMENT
FACILITY
ELEVATION A

NO.	DATE	BY	CHKD.	DESCRIPTION	REV.
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SK-305 11110

[illegible]

CO-FACILITY
~~STAND ALONE~~

PRELIMINARY

NOT APPROVED FOR CONSTRUCTION

U.S. DEPARTMENT OF ENERGY
RIDLING OPERATIONS OFFICE

PRE-TREATMENT
FACILITY
ELEVATION B

1952-53

WWW PRE-TREATMENT FACTSHEET

EX-1369 2443

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6K 306	111
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JK-553 111

REFERENCES

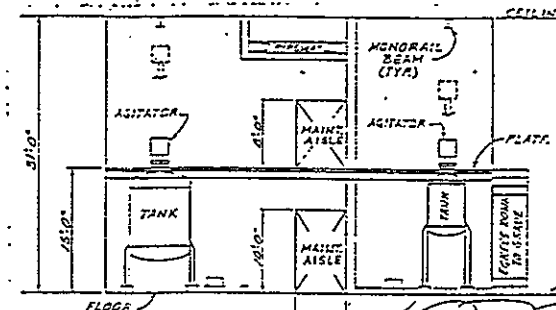
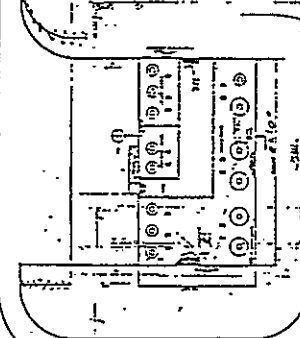
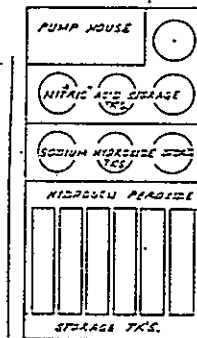
9112101034

FOR PLOT SEE
OVERALL LAYOUT

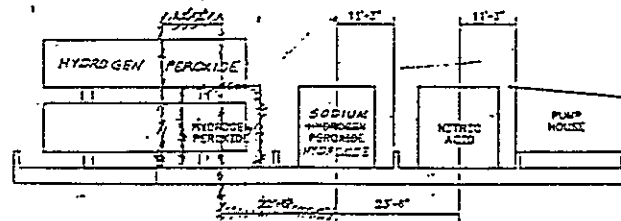
HWVP PRE-TREATMENT FACILITY

(ES-800-01 TO ES-800-09)

FEB 15 1989



PLAN
N.T.S.



VESSEL	SIZE	QTY
HYDROGEN PEROXIDE	1 300 X 100	1/2
SODIUM HYDROXIDE STORAGE TANK	1 150 X 100	3
NITRIC ACID	1 150 X 100	4

CO-FACILITY

THIS DRAWING ONLY
NO CHANGE FROM
"STAND ALONE"

PRELIMINARY

NOT APPROVED FOR CONSTRUCTION

U.S. DEPARTMENT OF ENERGY
RICHLAND OPERATIONS OFFICE

PRE-TREATMENT
FACILITY
COLD CHEMICAL
SUPPLY AREA

HWVP PRE-TREATMENT FACILITY

ES-800-01 TO ES-800-09

SK-307 1110

NUMBER	TITLE	NUMBER	TITLE	NUMBER	TITLE	NUMBER	TITLE	NUMBER	TITLE
1	DRAWING LIST	1	REVISIONS	1	REVISIONS	1	REVISIONS	1	REVISIONS
1	DRAWING TRACED LIST	1	REVISIONS	1	REVISIONS	1	REVISIONS	1	REVISIONS
1	DRAWING TRACED LIST	1	REVISIONS	1	REVISIONS	1	REVISIONS	1	REVISIONS

ATTACHMENT 2

FLUOR DANIEL

Fluor Daniel Inc
3333 Michelson Drive Irvine CA 92714
(714) 975-2200

March 3, 1989

Westinghouse Hanford Company
P.O. Box 1970
Richland, Washington 99352

Attn: Mr. R. P. Anantatmula

Gentlemen:

Rough Order of Magnitude (ROM) Cost Study
for WHC Stand-Alone Alternative

Reference: Pre-Treatment Cost Studies, dated February 22, 1989

As requested by WHC on February 24, 1989, Fluor Daniel has prepared a ROM cost study for the Stand-Alone Facility (enclosed), based on the WHC provided drawings. It is important to make the following observations regarding the attached ROM estimate:

- 1) The ROM estimate was prepared over a two day time period by applying factors from the Stand-Alone estimate (reference). In order to respond in the required time frame, the estimating technique used factors which were applied to allowances and/or areas that were originally factored. An estimate produced in this manner should be used with caution.
- 2) As noted in the referenced cost studies, Fluor Daniel had strong reservations regarding the viability of the facility depicted on the drawings provided by WHC. Examples of the reservations were the absence of chiller rooms for the HVAC and the absence of adequate lay down and maintenance areas. In fact, it was these types of concerns that led to the development of the stand-alone estimate presented in the referenced report.
- 3) The estimate is subject to the estimate bases and limitations described in Section 3.0 of the enclosed cost study.

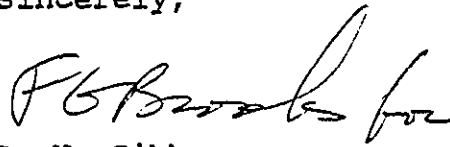
FLUOR DANIEL

Mr. R. P. Anantatmula
Westinghouse Hanford Company
Richland, Washington 99352

March 3, 1989
2

If you have any questions regarding the enclosed information,
please contact Jon Smets at (714) 975-5120 or Chuck Guenther at
(714) 975-5773.

Sincerely,



R. N. Gibbons
Project Manager

for
RNG:CDG:nmd
Enclosures

FLUOR DANIEL

Cost Study

Process and Facility Options for Pre-Treatment
of Hanford Tank Wastes

Stand-Alone Concept (WHC Concept)

March, 1989

Fluor Daniel Inc.
Advanced Technology Division
Irvine, California



FLUOR DANIEL

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FLUOR DANIEL

References

1. Cost Studies - Process and Facility Options for Pre-Treatment of Hanford Tank Wastes, dated February, 1989, - by Fluor Daniel Inc.



FLUOR DANIEL

1.0 Introduction

Fluor Daniel was requested to prepare cost studies for three pre-treatment alternatives by Westinghouse Hanford Company (WHC). The cost studies were provided via a report titled, Cost Studies - Process and Facility Options for Pre-Treatment of Hanford Tank Wastes, dated, February, 1989. A "stand-alone" concept was included in the above study based on a concept developed by WHC. Fluor Daniel was requested to review the original concept and incorporate the necessary modifications in conjunction with WHC. The modifications included such items as additional contact and remote maintenance and laydown areas, addition of a chiller room for the HVAC, expanded HVAC equipment rooms, addition of an off-gas system, and expansion of the cold chemical storage area. The extent of these modifications are discussed in the referenced report.

During the course of the development of the cost studies, WHC requested that Fluor Daniel develop a ROM cost for the "stand-alone" pre-treatment facility as originally submitted by WHC. This cost study would be utilized to compare other alternatives on a common basis. Fluor Daniel responded to the request by providing a ROM cost study which was prepared over a two day time period from the previously developed data, and the results are included herein.



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2.0 Description

A cost study for the "original" WHC stand-alone pre-treatment facility was based on the drawings included as Appendix 1. The ROM estimate utilized data developed for the stand-alone pre-treatment facility submitted in the reference (Ref. 1). The estimate basis and qualifications are described in Section 3.0 of this report.

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3.0 Basis and Assumptions

3.1 General Basis

The direct costs for the stand-alone pre-treatment facility were estimated using the following methods:

- o Allowances from the HWVP Reference Conceptual Design (RCD) Rev. 1 estimate.
- o MTO using unit rates of installation derived from the RCD Rev. 1 estimate, expressed in 1988 dollars.
- o Equipment factored estimates using equipment cost to direct installed costs based on ratios (factors) derived from the RCD Rev. 1 estimate.

Engineering/Design and engineering and inspection during construction, construction and project management costs were estimated as percentages of direct costs based on indirect to direct cost relationships in the RCD Rev. 1 estimate.

All costs were estimated in GFY 1988 dollars and escalated by 4.35% to GFY 1989 (as requested by WHC) to achieve compatibility with the KEH estimate of the facility. The basis for escalation is Kaiser's table KEHRII dated 2/22/89, using February 1989 as the base date.

The schedule utilized for escalation was the same schedule used for the stand-alone pre-treatment facility included in the referenced cost study.

The contingency evaluation was based on the contingency analysis used for the stand-alone pre-treatment facility included in the referenced cost study. It is the opinion of

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Fluor Daniel, that the contingency calculated in this manner may not be consistent with the estimating techniques used to develop the estimate. A detailed contingency analysis should be performed for this estimate if this pre-treatment alternative becomes viable.

The "original" WHC drawings are included as Attachment 1.

All costs are Total Estimated Costs (TEC). Expense funded costs such as Research and Development and Conceptual Design are not included. Life cycle costs have not been estimated.

3.2 Specific Basis

<u>Direct Cost Category</u>	<u>1988 \$ x 1,000</u>	<u>EST'G Method</u>	<u>Remarks</u>
Temp Const	2,500	Allowance	Same allowance as Fluor's "Stand-Alone" 212,000 FT ² pre-treatment facility estimate. (\$2,500M is approximately 80% of RCD Rev. 1 estimate of temp const.)
Site Prep	935	Allowance	Allowance from Fluor's "Stand-Alone" 212,000 FT ² facility estimate. Includes security fence/lighting/roads & site clearance based on 175,000 FT ² facility footprint. (Unit rates from RCD Rev. 1 estimate)
Structures	50,329	MTO	ROM, MTO based on WHC furnished 175,000 FT ² facility dwgs (175,000 FT ² facility). This category includes sitework, concrete, structural steel, cell lining, & architectural costs.
Fire Prot. & Det.	2,000	Allowance	Same allowance as Fluor's "Stand-Alone" 212,000 FT ² estimate. (allowance of double RCD Rev. 1 Vit Bldg cost for this category)
HVAC	10,000	ROM Allowance	Factored from Fluor's "Stand-Alone" 212,000 FT ² estimate: $\text{HVAC Cost for the } 212,000 \text{ FT}^2 \text{ FAC} = \left(\frac{\text{VOL } 175,000 \text{ FT}^2 \text{ FAC}}{\text{VOL } 212,000 \text{ FT}^2 \text{ FAC}} \right)^{.6}$
In-Cell Pipe	12,278	Various	This cost category includes the following items: <ul style="list-style-type: none"> o embedded pipe o hot pipe trench o in-cell jumpers

<u>Direct Cost Category</u>	<u>1988 \$ x 1,000</u>	<u>EST'G Method</u>	<u>Remarks</u>
HP System	10,560	Allowance	Same allowance as Fluor's "Stand-Alone" 212,000 FT ² est. (Equipment factored estimate based on HWVP HP equipment cost to installed direct cost ratios.)
Communications	250	Allowance	Same allowance as Fluor's "Stand-Alone" 212,000 FT ² facility estimate. (Allowance from HWVP Vit Bldg Estimate.)
Remote Handling, Sampling Analytical Maint Repair. This cost category includes:	18,296	Equipment Factored Estimate	The equipment included in this category was not included with in the WHC data received & by Fluor. Based on the Fluor "Stand-Alone" 212,000 FT ² facility estimate equipment list, Fluor coordinated with WHC as to which pieces or quantities of equipment to include in the WHC 175,000 FT ² "Stand-Alone" facility estimate. The marked up equipment list is included as Appendix 2. Equipment was factored to installed direct costs by applying the same factors used in Fluor's "Stand-Alone" 212,000 FT ² facility estimate.
o Regulated, Non-Regulated & MSM Repair			
o Equipment decon, Repair and Maintenance			
o Process Sampling			
o Analytical			
o Remote Handling Equipment			
In-Cell Equipment	37,779	Equipment Factored Estimate	The Fluor "Stand-Alone" 212,000 FT ² facility equipment list (see Appendix 2) was adjusted to conform to the equipment list furnished to Fluor by WHC see Appendix 2. The resultant total equipment cost was factored to installed direct costs by applying the same factor used in Fluor's "Stand-Alone" 212,000 FT ² facility estimate.

<u>Direct Cost Category</u>	<u>1988 \$ x 1,000</u>	<u>EST'G Method</u>	<u>Remarks</u>
Cold Chemical in Bldg Cold Chemical out of Bldg	4,123	Equipment Factored Estimates	The equipment included in these categories were not shown entirely in the equipment list or drawings furnished to Fluor by WHC. Based on the Fluor "Stand-Alone" 212,000 FT ² facility estimate equipment list, Fluor coordinated with WHC as to which pieces of equipment to include in the WHC "Stand-Alone" 175,000 FT ² facility estimate. The marked up equipment list is included as Appendix 2. Equipment was factored to installed direct costs applying to the same factors used in Fluor's "Stand-Alone" 212,000 FT ² facility estimate.
Construction Start-Up	1,980	Allowance	Construction start-up is based on a percentage (1.02%) of direct costs. This is the percentage allowance used in Fluor's "Stand-Alone" 212,000 FT ² facility estimate, and is derived from the HWVP estimate.
Escalate 1988 Direct Cost \$ to 1989	8,530	Direction	The Fluor "Stand-Alone" 212,000 FT ² facility estimate of direct costs was estimated by Fluor (at WHCs direction) in GFY 1988 dollars. WHC requested the direct costs of the 175,000 FT ² facility in GFY 1989 dollars. An escalation factor of 4.35% was used to escalate GFY 1988 dollars to GFY 1989 dollars. The percentage was submitted to Fluor by KEH.



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4.0 TEC Estimate

A summary of the Total Estimated Cost (TEC) for the "original" WHC Stand-Alone Pre-Treatment facility is provided in Table 4-1. A summary of the Direct Costs, along with a brief estimate basis, is included as Table 4-2. The TEC estimate is subject to the basis and assumptions described in Section 3.0.

TABLE 4-1. TOTAL ESTIMATED COST(TEC) SUMMARY - X \$1,000
FOR WHC "ORIGINAL" PRE-TREATMENT CONCEPT

COST CATEGORIES	WHC "ORIGINAL" STAND-ALONE
Detailed Design	\$45,424
Field Engr & Inspection	\$17,801
Construction	\$204,613
Engineering Management	\$17,187
Construction Management	\$12,072
Project Management	\$15,346
Total Cost (Fy 89 Basis)	\$312,443
Escalation	\$192,233
Contingency	\$163,290
Total Estimated Cost	\$667,966

**TABLE 4-2. STAND-ALONE FACILITY CONSTRUCTION COST ESTIMATE SUMMARY & BASIS
FOR WHC "ORIGINAL" PRE-TREATMENT CONCEPT**

COST CATEGORIES	DIRECT COST X 1,000 (1988 \$)	ESTIMATE BASIS
Temporary Construction	\$2,500	Same allowance as Fluor Stand-Alone estimate
Site Prep	\$935	Fluor Stand-Alone estimate, factored to 175,000 sq ft footprint
Structures	\$50,329	ROM MTO based on WHC drawings Applied HWVP unit installation rates
Fire Protection/Detection	\$2,000	Same allowance as Fluor Stand-Alone estimate
HVAC	\$10,000	ROM estimate factored from Fluor Stand-Alone estimate based on the ratio of the volume of the two facilities
In-Cell Pipe	\$12,278	Jumpers - Based on WHC count of 600 jumpers Embedded pipe and hot pipe trench were a ratio from the Fluor Stand-Alone facility based on the number of in-cell tanks
Electrical Supply	\$1,593	Same allowance as Fluor Stand-Alone estimate
Electrical Distribution	\$5,720	Same allowance as Fluor Stand-Alone estimate
Process Utilities	\$18,159	Same allowance as Fluor Stand-Alone estimate
DCS System	\$12,896	Same allowance as Fluor Stand-Alone estimate Installation factored from HWVP
HP System	\$10,560	Same allowance as Fluor Stand-Alone estimate
Communications	\$250	Same allowance as Fluor Stand-Alone estimate
Remote Handling, Sampling, Analytical & Maint Repair	\$18,296	The remote equipment used in this estimate was coordinated with WHC. See priced equipment list.
Process Equipment:		
In-Cell Equipment	\$37,779	Equipment based on WHC supplied equipment list
Cold Chemical - In Bldg	\$4,123	Same allowance as Fluor Stand-Alone estimate
Cold Chemical - Out of Bldg	\$6,685	Same allowance as Fluor Stand-Alone estimate
Construction Startup	\$1,980	Factored from HWVP direct construction costs
Operations Control Building	\$0	
S/T DIRECT COST-1988 \$	\$196,083	
ESC TO 1989 \$ @ 0.0435	\$8,530	
TOTAL DIRECT COST-1989 \$	\$204,613	

APPENDIX 1

FACILITY DRAWINGS

ATTACHMENT 3

CORPORATE HEADQUARTERS
TELEPHONE: (714) 975-2000
TELEX: 68-1441
MESSAGE CENTER FACSIMILE
OMNIFAX G99 (714) 975-5981 GP 1, 2, 3
RAPICOM: (714) 975-5963
FACSIMILE CONFIRMATION (714) 975-6988

FLUOR
IRVINE
FACSIMILE LEAD SHEET

3/1/89

ENGINEERS, INC.
SOUTHERN CALIFORNIA DIVISION
TELEPHONE: (714) 975-2000
TELEX: ITT 4720147
W.U. 181625
MESSAGE CENTER FACSIMILE
RAPICOM: (714) 975-5271
OMNIFAX G96 (714) 975-6548 GP 1, 2, 3
OMNIFAX G98 (714) 975-3778 GP 1, 2, 3
FACSIMILE CONFIRMATION: (714) 975-5272

Number of documents
including lead sheet: 3

PLEASE COMPLETE THE FOLLOWING

To: Company Name: W H C
Attn: R. P. Amantatmula (MO) x 5858
City: Richland State: WA Country: _____
Originator's Name: C. D. Gruenther Extension: 5773
Facsimile Number to be called: Area Code: _____ Number: _____
Facsimile Confirmation Number: Area Code: _____ Number: _____
Charge to Org. Number: _____ Contract Number: _____ Emp. Number: _____
Return Originals Through Interoffice Mail to: _____ Location: _____
Call for Pickup of Originals After Transmission, Name: _____ Extension: _____

SPECIAL INFORMATION OR INSTRUCTIONS TO RECIPIENT

FOR MESSAGE CENTER

Time and Date Transmitted: _____ Receipt Confirmed: _____
Confirmed By: _____

Operator's
initials:

TABLE 4-1. TOTAL ESTIMATED COST (TEC) SUMMARY - x \$1,000
FOR WHC "ORIGINAL" PRE-TREATMENT CONCEPT

COST CATEGORIES	WHC "ORIGINAL" CO-LOCATED
Detailed Design	\$42,751
Field Engr & Inspection	\$16,754
Construction	\$192,571
Engineering Management	\$16,176
Construction Management	\$11,362
Project Management	\$14,443
Total Cost (Fy 89 Basis)	\$294,057
Escalation	\$187,195
Contingency	\$155,991
Total Estimated Cost	\$637,243
=====	=====

**TABLE 4-2. CO-LOCATED FACILITY CONSTRUCTION COST ESTIMATE SUMMARY & BASIS
FOR WHC "ORIGINAL" PRE-TREATMENT CONCEPT**

COST CATEGORIES	DIRECT COST X 1,000 (1988 \$)	ESTIMATE BASIS
Temporary Construction	\$1,000	Same allowance as Fluor Co-Located estimate
Site Prep	\$79	Fluor Co-Located estimate, factored to 175,000 sq ft footprint
Structures	\$50,891	ROM MTO based on WHC drawings Applied HWVP unit installation rates
Fire Protection/Detection	\$2,000	Same allowance as Fluor Co-Located estimate
HVAC	\$8,000	ROM estimate factored from Fluor Co-Located estimate based on the ratio of the volume of the two facilities
In-Cell Pipe	\$12,278	Jumpers - Based on WHC count of 600 jumpers Embedded pipe and hot pipe trench were a ratio from the Fluor Stand-Alone facility based on the number of in-cell tanks
Electrical Supply	\$184	Same allowance as Fluor Co-Located estimate
Electrical Distribution	\$5,720	Same allowance as Fluor Co-Located estimate
Process Utilities	\$13,351	Same allowance as Fluor Co-Located estimate
DCS System	\$12,896	Same allowance as Fluor Co-Located estimate Installation factored from HWVP
HP System	\$9,148	Same allowance as Fluor Co-Located estimate
Communications	\$250	Same allowance as Fluor Co-Located estimate
Remote Handling, Sampling, Analytical & Maint Repair	\$18,296	The remote equipment used in this estimate was coordinated with WHC. See priced equipment list.
Process Equipment:		
In-Cell Equipment	\$37,779	Equipment based on WHC supplied equipment list
Cold Chemical - In Bldg	\$4,123	Same allowance as Fluor Co-Located estimate
Cold Chemical - Out of Bldg	\$6,685	Same allowance as Fluor Co-Located estimate
Construction Startup	\$1,863	Factored from HWVP direct construction costs
Operations Control Building	\$0	
S/T DIRECT COST-1988 \$	\$184,543	
ESC TO 1989 \$ @ 0.0435	\$8,028	
TOTAL DIRECT COST-1989 \$	\$192,571	

2011057

ATTACHMENT 4

CORPORATE HEADQUARTERS

TELEPHONE: (714) 975-2000

TELEX: 68 1441

MESSAGE CENTER FACSIMILE

OMNIFAX G99 (714) 975-5981 GP 1, 2, 3

RAPICOM: (714) 975-5983

FACSIMILE CONFIRMATION: (714) 975-6988

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IRVINE

FACSIMILE LEAD SHEET

ENGINEERS, INC.

SOUTHERN CALIFORNIA DIVISION

TELEPHONE: (714) 975-2000

TELEX: ITT 4720147

W.U. 181625

MESSAGE CENTER FACSIMILE

RAPICOM: (714) 975-5271

OMNIFAX G96 (714) 975-8549 GP 1, 2, 3

OMNIFAX G99 (714) 975-3778 GP 1, 2, 3

FACSIMILE CONFIRMATION: (714) 975-5272

Number of documents

29

including lead sheet.

PLEASE COMPLETE THE FOLLOWING

To: Company Name: Westinghouse Hanford Company

Attn: F. P. Anantatmula

City: Richland

State: WA

Country: _____

Originator's Name: Jack Donnelly

Extension: 4434

Facsimile Number to be called: Area Code: 166

Number: 440-2908

Facsimile Confirmation Number: Area Code: _____

Number: _____

Charge to Org. Number: _____

Contract Number: _____

Emp. Number: _____

Return Originals Through Interoffice Mail to: _____

Location: _____

Call for Pickup of Originals After Transmission, Name: _____

Extension: _____

SPECIAL INFORMATION OR INSTRUCTIONS TO RECIPIENT

FOR MESSAGE CENTER

Time and Date Transmitted: _____

Receipt Confirmed: _____

Confirmed By: _____

Operator's
initials:

FLUOR DANIEL

Cost Study

Process and Facility Options for Pre-Treatment
of Hanford Tank Wastes

WHC 132,000 sq ft Stand-Alone Concept

March 9, 1989

Fluor Daniel Inc.
Advanced Technology Division
Irvine, California



FLUOR DANIEL

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FLUOR DANIEL

References

1. Cost Studies - Process and Facility Options for Pre-Treatment of Hanford Tank Wastes, dated February, 1989, - by Fluor Daniel Inc.
2. Cost Study - Process and Facility Options for Pre-Treatment of Hanford Tank Wastes, Stand-Alone Concept (WHC Concept), dated March 1989, - by Fluor Daniel, Inc.



FLUOR DANIEL

1.0 Introduction

Fluor Daniel was requested to prepare cost studies for three pre-treatment alternatives by Westinghouse Hanford Company (WHC). The cost studies were provided via a report titled, Cost Studies - Process and Facility Options for Pre-Treatment of Hanford Tank Wastes, dated, February, 1989. A "stand-alone" concept was included in the above study based on a concept developed by WHC. Fluor Daniel was requested to review the original concept and incorporate the necessary modifications in conjunction with WHC. The modifications included such items as additional contact and remote maintenance and laydown areas, addition of a chiller room for the HVAC, expanded HVAC equipment rooms, addition of an off-gas system, and expansion of the cold chemical storage area. The extent of these modifications are discussed in reference 1.

During the course of the development of the cost studies, WHC requested that Fluor Daniel develop a ROM cost for the "stand-alone" pre-treatment facility as originally submitted by WHC. This cost study would be utilized to compare other alternatives on a common basis. Fluor Daniel responded to the request by providing a ROM cost study submitted as reference 2.

In early March, WHC requested Fluor Daniel to develop an additional ROM cost estimate for a 132,000 sq ft facility. The estimate was prepared over a two day time period, using previously developed data, and the results are included herein.



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2.0 Description

A cost study for the 132,000 sq ft WHC stand-alone pre-treatment facility was based on the drawings included as Appendix 1. The ROM estimate utilized data developed for the stand-alone pre-treatment facility submitted in references 1 and 2. The estimate basis and qualifications are described in Section 3.0 of this report.

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3.0 Basis and Assumptions

3.1 General Basis

The direct costs for the stand-alone pre-treatment facility were estimated using the following methods:

- o Allowances from the HWVP Reference Conceptual Design (RCD) Rev. 1 estimate.
- o MTO using unit rates of installation derived from the RCD Rev. 1 estimate, expressed in 1988 dollars.
- o Equipment factored estimates using equipment cost to direct installed costs based on ratios (factors) derived from the RCD Rev. 1 estimate.

Engineering/Design and engineering and inspection during construction, construction and project management costs were estimated as percentages of direct costs based on indirect to direct cost relationships in the RCD Rev. 1 estimate.

All costs were estimated in GFY 1988 dollars and escalated by 4.35% to GFY 1989 (as requested by WHC) to achieve compatibility with the KEH estimate of the facility. The basis for escalation is Kaiser's table KEHR11 dated 2/22/89, using February 1989 as the base date.

The schedule utilized for escalation was the same schedule used for the stand-alone pre-treatment facility included in the referenced cost study.

The contingency evaluation was based on the contingency analysis used for the stand-alone pre-treatment facility included in the referenced cost study. It is the opinion of



FLUOR DANIEL

Fluor Daniel, that the contingency calculated in this manner may not be consistent with the estimating techniques used to develop the estimate. A detailed contingency analysis should be performed for this estimate if this pre-treatment alternative becomes viable.

The WHC drawings for the 132,000 sq ft facility are included as Attachment 1.

All costs are Total Estimated Costs (TEC). Expense funded costs such as Research and Development and Conceptual Design are not included. Life cycle costs have not been estimated.

3.2 Specific Basis

<u>Direct Cost Category</u>	<u>1988 \$ x 1,000</u>	<u>EST'G Method</u>	<u>Remarks</u>
Temp Const	2,500	Allowance	Same allowance as Fluor's "Stand-Alone" 212,000 FT ² pre-treatment facility estimate. (\$2,500M is approximately 80% of RCD Rev. 1 estimate of temp const.)
Site Prep	938	Allowance	Allowance from Fluor's "Stand-Alone" 212,000 FT ² facility estimate. Includes security fence/lighting/roads & site clearance based on 132,000 FT ² facility footprint. (Unit rates from RCD Rev. 1 estimate)
Structures	40,632	MTO	ROM, MTO based on WHC furnished 132,000 FT ² facility dwgs. This category includes sitework, concrete, structural steel, cell lining, & architectural costs.
Fire Prot. & Det.	2,000	Allowance	Same allowance as Fluor's "Stand-Alone" 212,000 FT ² estimate. (allowance of double RCD Rev. 1 Vit Bldg cost for this category)
HVAC	7,500	ROM Allowance	Factored from Fluor's "Stand-Alone" 212,000 FT ² estimate: $\text{HVAC Cost for the } 212,000 \text{ FT}^2 \text{ FAC} = \frac{\text{VOL } 132,000 \text{ FT}^2 \text{ FAC}}{\text{VOL } 212,000 \text{ FT}^2 \text{ FAC}} \times .6$
In-Cell Pipe items:	12,231	Various	This cost category includes the following <ul style="list-style-type: none"> o embedded pipe o hot pipe trench o in-cell jumpers

<u>Direct Cost Category</u>	<u>1988 \$ x 1,000</u>	<u>EST'G Method</u>	<u>Remarks</u>
			<p>The unit costs for the above items are from Fluor's "Stand-Alone" 212,000 FT² facility adjusted to the 132,000 FT² facility by the following methods:</p> <p>o embedded pipe</p> $\begin{array}{l} 212,000 \text{ FT}^2 \\ \text{Cost} \end{array} \times \frac{30 \text{ in-cell tanks}}{39 \text{ in-cell tanks}}$ <p>o hot pipe trench:</p> $\begin{array}{l} 212,000 \text{ FT}^2 \\ \text{Cost} \end{array} \times \frac{\text{Hot Trench Length } 132,000 \text{ FT}^2 \text{ EST}^{.6}}{\text{Hot Trench Length } 212,000 \text{ FT}^2 \text{ EST}}$ <p>o in-cell jumpers:</p> <p>600 jumpers (furnished by WHC) x direct cost per jumper derived from the RCD Rev. 1 estimate.</p>
Electrical Supply	1,593	Allowance	Same allowance as Fluor's "Stand-Alone" 212,000 FT ² est.
Electrical Distribution	5,720	Allowance	Same allowance as Fluor's "Stand-Alone" 212,000 FT ² est.
Process Utilities	18,159	Allowance	Same allowance as Fluor's "Stand-Alone" 212,000 FT ² est. (Capacity factored HWVP RCD Rev. 1 utility system estimate.)
DCS	12,896	Allowance	Same allowance as Fluor's "Stand-Alone" 212,000 FT ² est. (Equipment factored estimate based on HWVP DCS equipment cost to installed direct cost ratios.)

<u>Direct Cost Category</u>	<u>1988 \$ x 1,000</u>	<u>EST'G Method</u>	<u>Remarks</u>
HP System	10,560	Allowance	Same allowance as Fluor's "Stand-Alone" 212,000 FT ² est. (Equipment factored estimate based on HWVP HP equipment cost to installed direct cost ratios.)
Communications	250	Allowance	Same allowance as Fluor's "Stand-Alone" 212,000 FT ² facility estimate. (Allowance from HWVP Vit Bldg Estimate.)
Remote Handling, Sampling Analytical Maint Repair. This cost category includes:	18,084	Equipment Factored Estimate	The equipment included in this category was not included with in the WHC data received & by Fluor. Based on the Fluor "Stand-Alone" 212,000 FT ² facility estimate equipment list, Fluor coordinated with WHC as to which pieces or quantities of equipment to include in the WHC 132,000 FT ² "Stand-Alone" facility estimate. The marked up equipment list is included as Appendix 2. Equipment was factored to installed direct costs by applying the same factors used in Fluor's "Stand-Alone" 212,000 FT ² facility estimate.
o Regulated, Non-Regulated & MSM Repair			
o Equipment decon, Repair and Maintenance			
o Process Sampling			
o Analytical			
o Remote Handling Equipment			
In-Cell Equipment	37,779	Equipment Factored Estimate	The Fluor "Stand-Alone" 212,000 FT ² facility equipment list (see Appendix 2) was adjusted to conform to the equipment list furnished to Fluor by WHC see Appendix 2. The resultant total equipment cost was factored to installed direct costs by applying the same factor used in Fluor's "Stand-Alone" 212,000 FT ² facility estimate.

<u>Direct Cost Category</u>	<u>1988 \$ x 1,000</u>	<u>EST'G Method</u>	<u>Remarks</u>
Cold Chemical in Bldg	4,123	Equipment Factored	The equipment included in these categories were not shown entirely in the equipment list or drawings furnished to Fluor by WHC. Based on the Fluor "Stand-Alone" 212,000 FT ² facility estimate equipment list, Fluor coordinated with WHC as to which pieces of equipment to include in the WHC "Stand-Alone" 132,000 FT ² facility estimate. The marked up equipment list is included as Appendix 2. Equipment was factored to installed direct costs applying to the same factors used in Fluor's "Stand-Alone" 212,000 FT ² facility estimate.
Cold Chemical out of Bldg	6,685	Estimates	
Construction	1,735	Allowance	Construction start-up is based on a Start-Up percentage (1.02%) of direct costs. This is the percentage allowance used in Fluor's "Stand-Alone" 212,000 FT ² facility estimate, and is derived from the HWVP estimate.
Escalate 1988 Direct Cost \$ 1989	7,530	Direction	The Fluor "Stand-Alone" 212,000 FT ² facility estimate of direct costs was estimated by to Fluor (at WHCs direction) in GFY 1988 dollars. WHC requested the direct costs of the 132,000 FT ² facility in GFY 1989 dollars. An escalation factor of 4.35% was used to escalate GFY 1988 dollars to GFY 1989 dollars. The percentage was submitted to Fluor by KEH.



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4.0 TEC Estimate

A summary of the Total Estimated Cost (TEC) for the WHC 132,000 sq ft Stand-Alone Pre-Treatment facility is provided in Table 4-1. A summary of the Direct Costs, along with a brief estimate basis, is included as Table 4-2. The TEC estimate is subject to the basis and assumptions described in Section 3.0.

TABLE 4-1. TOTAL ESTIMATED COST (TEC) SUMMARY - X \$1,000
FOR WHC 132,000 SQ FT PRE-TREATMENT CONCEPT

COST CATEGORIES	WHC "ORIGINAL" STAND-ALONE
Detailed Design	\$40,112
Field Engr & Inspection	\$15,720
Construction	\$180,690
Engineering Management	\$15,178
Construction Management	\$10,660
Project Management	\$13,550
Total Cost (Fy 89 Basis)	\$275,910
Escalation	\$169,760
Contingency	\$145,140
Total Estimated Cost	\$590,810

**TABLE 4-2. STAND-ALONE FACILITY CONSTRUCTION COST ESTIMATE SUMMARY & BASIS
FOR WHC 132,000 SQ FT PRE-TREATMENT CONCEPT**

COST CATEGORIES	DIRECT COST X 1,000 (1988 \$)	ESTIMATE BASIS
Temporary Construction	\$2,500	Same allowance as Fluor Stand-Alone estimate
Site Prep	\$938	Fluor Stand-Alone estimate, factored to 132,000 sq ft footprint
Structures	\$40,632	ROM MTO based on WHC drawings Applied HWVP unit installation rates
Fire Protection/Detection	\$2,000	Same allowance as Fluor Stand-Alone estimate
HVAC	\$7,500	ROM estimate factored from Fluor Stand-Alone estimate based on the ratio of the volume of the two facilities
In-Cell Pipe	\$12,231	Jumpers - Based on WHC count of 600 jumpers Embedded pipe and hot pipe trench were a ratio from the Fluor Stand-Alone facility based on the number of in-cell tanks
Electrical Supply	\$1,593	Same allowance as Fluor Stand-Alone estimate
Electrical Distribution	\$5,720	Same allowance as Fluor Stand-Alone estimate
Process Utilities	\$13,700	ROM estimate factored from Fluor Stand-Alone estimate based on the ratio of square footage.
DCS System	\$12,896	Same allowance as Fluor Stand-Alone estimate Installation factored from HWVP
HP System	\$10,560	Same allowance as Fluor Stand-Alone estimate
Communications	\$250	Same allowance as Fluor Stand-Alone estimate
Remote Handling, Sampling, Analytical & Maint Repair	\$18,084	The remote equipment used in this estimate was coordinated with WHC. See priced equipment list.
Process Equipment:		
In-Cell Equipment	\$32,013	Equipment based on WHC supplied equipment list
Cold Chemical - In Bldg	\$4,123	Same allowance as Fluor Stand-Alone estimate
Cold Chemical - Out of Bldg	\$6,685	Same allowance as Fluor Stand-Alone estimate
Construction Startup	\$1,735	Factored from HWVP direct construction costs
Operations Control Building	\$0	
S/T DIRECT COST-1988 \$	\$173,160	
ESC TO 1989 \$ @ 0.0435	\$7,530	
TOTAL DIRECT COST-1989 \$	\$180,690	

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APPENDIX 1

FACILITY DRAWINGS

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APPENDIX Z

EQUIPMENT LIST

ITEM	LOCATION	QTY	CAPACITY	DIMENSION	MATERIAL	1988 \$
DISSOLVER A	PROCESS CELL	1	10 GPM 20,700	15" WIDE X 15.5" HIGH X 20" LONG	HASTELLOY C-276	2,135 ⁶ (20,700 / 42,000) = 1,396
DISSOLVER A	PROCESS CELL	1	10 GPM	15" WIDE X 15.5" HIGH X 20" LONG	HASTELLOY C-276	2,135
DISSOLVER A	PROCESS CELL	1	10 GPM	15" WIDE X 15.5" HIGH X 20" LONG	HASTELLOY C-276	2,135
DISSOLVER A	PROCESS CELL	1	10 GPM	15" WIDE X 15.5" HIGH X 20" LONG	HASTELLOY C-276	2,135
DISSOLVER A	PROCESS CELL	1	10 GPM	15" WIDE X 15.5" HIGH X 20" LONG	HASTELLOY C-276	2,135
DISSOLVER A	PROCESS CELL	1	10 GPM	15" WIDE X 15.5" HIGH X 20" LONG	HASTELLOY C-276	2,135
DISSOLVER A CONDENSER/DE-ENTRAINER	PROCESS CELL	1	10 GPM	MODULE 15" WIDE X 15" HIGH X 20" LONG	STAINLESS STEEL	316
SLUDGE RECEIVER A	PROCESS CELL	1	10 GPM 14,500	15" WIDE X 15.5" HIGH X 20" LONG	SST 304L	622 ⁶ (14,500 / 29,000) = 410
SLUDGE RECEIVER A TRANSFER PUMP A	PROCESS CELL	1			SST 304L	125
SLUDGE RECEIVER A SAMPLE PUMP A	PROCESS CELL	1			SST 304L	100
SLUDGE RECEIVER A AGITATOR A	PROCESS CELL	1			SST 304L	253
DISSOLVER A	PROCESS CELL	1	10 GPM	15" WIDE X 15.5" HIGH X 20" LONG	HASTELLOY C-276	2,135
DISSOLVER B	PROCESS CELL	1	10 GPM 29,700	15" WIDE X 15.5" HIGH X 27" LONG	HASTELLOY C-276	2,135 ⁶ (29,700 / 42,000) = 1,135
DISSOLVER B	PROCESS CELL	1	10 GPM	15" WIDE X 15.5" HIGH X 27" LONG	HASTELLOY C-276	2,135
DISSOLVER B	PROCESS CELL	1	10 GPM	15" WIDE X 15.5" HIGH X 27" LONG	HASTELLOY C-276	2,135
DISSOLVER B	PROCESS CELL	1	10 GPM	15" WIDE X 15.5" HIGH X 27" LONG	HASTELLOY C-276	2,135
DISSOLVER B	PROCESS CELL	1	10 GPM	15" WIDE X 15.5" HIGH X 27" LONG	HASTELLOY C-276	2,135
DISSOLVER B	PROCESS CELL	1	10 GPM	15" WIDE X 15.5" HIGH X 27" LONG	HASTELLOY C-276	2,135
DISSOLVER B CONDENSER/DE-ENTRAINER	PROCESS CELL	1	10 GPM	MODULE 15" WIDE X 15" HIGH X 20" LONG	STAINLESS STEEL	316
SLUDGE RECEIVER B	PROCESS CELL	1	10 GPM 14,500	15" WIDE X 15.5" HIGH X 20" LONG	SST 304L	622 ⁶ (14,500 / 29,000) = 410
SLUDGE RECEIVER B TRANSFER PUMP B	PROCESS CELL	1			SST 304L	123
SLUDGE RECEIVER B AGITATOR B	PROCESS CELL	1			SST 304L	253
DISSOLVER B	PROCESS CELL	1	10 GPM	15" WIDE X 15.5" HIGH X 20" LONG	HASTELLOY C-276	2,135
SLUDGE RECEIVER B SAMPLE PUMP B	PROCESS CELL	1			SST 304L	100

ITEM	LOCATION	DIV	CAPACITY	DIMENSION	MATERIAL	1965 \$ (\$ x 1000)
ICE PRODUCT STORAGE	PROCESS CELL	1	5000 GAL		STAINLESS STEEL	350
TRANSFER PUMP A						123
CE PRODUCT STORAGE	PROCESS CELL	1				250
AGITATOR A						230
CE PROD RECEIVER	PROCESS CELL	1	1000 GAL		STAINLESS STEEL	68
CE PROD RECYR COOLING COIL	PROCESS CELL	1				123
TRANSFER PUMP A						250
CE PROD RECEIVER	PROCESS CELL	1	1000 GAL	13.5 DIA X 13.5' HIGH	STAINLESS STEEL	591
1x PROD RECEIVER COOLING COIL	PROCESS CELL	1				68
1x PROD RECEIVER	PROCESS CELL	1				123
TRANSFER PUMP A						250
CE ELUANT RECYCLE	PROCESS CELL	1	1000 GAL	13.5 DIA X 13.5' HIGH	STAINLESS STEEL	591
1x ELUANT RECYCLE COOLING COIL	PROCESS CELL	1				68
1x ELUANT RECYCLE	PROCESS CELL	1				123
TRANSFER PUMP A						250
CE ELUANT RECYCLE	PROCESS CELL	1				230
AGITATOR A						230
1x PUMP TANK	PROCESS CELL	1	1000 GAL		STAINLESS STEEL	68
1x PUMP TANK COOLING COIL	PROCESS CELL	1				123
1x PUMP TANK	PROCESS CELL	1				250
TRANSFER PUMP A						230
1x PUMP TANK	PROCESS CELL	1				230
AGITATOR A						230
1x WASTE RECEIVER	PROCESS CELL	1	2000 GAL		STAINLESS STEEL	68
1x WASTE RECEIVER COOLING COIL	PROCESS CELL	1				123
1x WASTE RECEIVER	PROCESS CELL	1				250
TRANSFER PUMP A						250
1x WASTE RECEIVER	PROCESS CELL	1				250
AGITATOR A						250
1x FEED STORAGE	PROCESS CELL	1	1000 GAL	13.5 DIA X 13.5' HIGH	STAINLESS STEEL	591
1x FEED STORAGE COOLING COIL	PROCESS CELL	1				68
1x FEED STORAGE	PROCESS CELL	1				123
TRANSFER PUMP A						250
1x FEED STORAGE	PROCESS CELL	1				250
AGITATOR A						250
SUMP COLLECTION TANK	PROCESS CELL	1	3000 GAL	10' DIA X 10' HIGH	STAINLESS STEEL	396
SUMP COLCTR TANK COOLING COIL	PROCESS CELL	1				68
SUMP COLLECTION TANK	PROCESS CELL	1				123
TRANSFER PUMP A						123

ITEM	LOCATION	QTY	CAPACITY	DIMENSION	MATERIAL	1-28 \$ \$ 1,000:
SOLVENT COLLECTION TANK AGITATOR A	PROCESS CELL	1				25
WASTE WASH SCRUBBER RECYCLE TANK AGITATOR A	PROCESS CELL	1	4000 GAL	10' DIA X 10' HIGH	STAINLESS STEEL	346
WASTE WASH SCRUBBER RECYCLE TANK TRANSFER PUMP A	PROCESS CELL	1	4000 GAL	10' DIA X 10' HIGH	STAINLESS STEEL	68
WASTE WASH SCRUBBER RECYCLE TANK AGITATOR A	PROCESS CELL	1	4000 GAL	10' DIA X 10' HIGH	STAINLESS STEEL	123
FEED MAKE UP TANK	PROCESS CELL	1	4000 GAL	10' DIA X 10' HIGH	STAINLESS STEEL	525
FEED MAKE UP TANK COOLING COIL			4000			68
FEED MAKE UP TANK TRANSFER PUMP A	PROCESS CELL	1				123
FEED MAKE UP TANK AGITATOR A	PROCESS CELL	1				253
FEED PUMP TANK	PROCESS CELL	1	4000 GAL	10' DIA X 10' HIGH	STAINLESS STEEL	525
FEED PUMP TANK COOLING COIL			4000			68
FEED PUMP TANK	PROCESS CELL	1				123
FEED PUMP TANK AGITATOR A	PROCESS CELL	1				253
WASTE RECEIVER TANK	PROCESS CELL	1	4000 GAL	10' DIA X 10' HIGH	STAINLESS STEEL	525
WASTE RECEIVER TANK COOLING COIL			4000			68
WASTE RECEIVER TANK TRANSFER PUMP A	PROCESS CELL	1				123
WASTE RECEIVER TANK AGITATOR A	PROCESS CELL	1				253
SOLVENT FEED TANK	PROCESS CELL	1	4000 GAL	8' DIA X 10' HIGH	STAINLESS STEEL	346
SOLVENT FEED TANK COOLING COIL			2000			68
SOLVENT FEED TANK FEED PUMP A	PROCESS CELL	1				123
SOLVENT FEED TANK AGITATOR A	PROCESS CELL	1				253
SOLVENT WASH WASTE TANK	PROCESS CELL	1	4000 GAL	8' DIA X 10' HIGH	STAINLESS STEEL	346
SOLVENT WASH WST TANK COOLING COIL			2000			68
SOLVENT WASH WASTE TANK FEED PUMP A	PROCESS CELL	1				123
SOLVENT WASH WASTE TANK AGITATOR A	PROCESS CELL	1	4000 GAL	8' DIA X 10' HIGH	STAINLESS STEEL	253
SOLVENT STORAGE TANK	PROCESS CELL	1	4000 GAL	8' DIA X 10' HIGH	STAINLESS STEEL	346
SOLVENT STORAGE TANK COOLING COIL			2000			68
SOLVENT STORAGE TANK TRANSFER PUMP A	PROCESS CELL	1				123
SOLVENT STORAGE TANK AGITATOR A	PROCESS CELL	1				253

$$\left(\frac{4000}{2000} \right)^{1.6} = 228$$

$$\left(\frac{4000}{2000} \right)^{1.6} = 228$$

$$\left(\frac{4000}{2000} \right)^{1.6} = 228$$

$$\left(\frac{4000}{2000} \right)^{1.6} = 346$$

$$\left(\frac{4000}{2000} \right)^{1.6} = 346$$

$$\left(\frac{4000}{2000} \right)^{1.6} = 346$$

ITEM	LOCATION	QTY	CAPACITY	DIMENSION	MATERIAL	1585 ³ (4' x 12'0")
TRU PRODUCT RECEIVER	PROCESS CELL	1	1400 GAL	6' DIA X 9' HIGH	STAINLESS STEEL	253
TRU CONDENSATE RECVR COOLING COIL						82
TRU TRANSFER PUMP A	PROCESS CELL	1				123
TRU CONCENTRATION & STRIPPER (W/ PACKED COLL.)	PROCESS CELL	1	1400 GAL 670	6' DIA X 9' HIGH 1' DIA X 6' HIGH	STAINLESS STEEL	316 * $\left(\frac{670}{1400}\right)^3 = 203$
TRU CONCENTRATION CONDENSER	PROCESS CELL	1		1' D X 5' LONG	STAINLESS STEEL	316
CONCENTRATED TRU RECEIVER A	PROCESS CELL	1	4000 GAL 2800	10' DIA X 11' HIGH	STAINLESS STEEL	442 * $\left(\frac{2800}{4000}\right)^3 = 280$
CONCENTD TRU RECVR A COOLING COIL						68
CONCENTRATED TRU RECEIVER A TRANSFER PUMP A	PROCESS CELL	1				123
CONCENTRATED TRU RECEIVER A AGITATOR A	PROCESS CELL	1				253
CONCENTRATED TRU RECEIVER B	PROCESS CELL	1	4000 GAL 2800	10' DIA X 11' HIGH	STAINLESS STEEL	442 * $\left(\frac{2800}{4000}\right)^3 = 280$
CONCENTD TRU RECVR B COOLING COIL						68
CONCENTRATED TRU RECEIVER B TRANSFER PUMP A	PROCESS CELL	1				123
CONCENTRATED TRU RECEIVER B AGITATOR A	PROCESS CELL	1				253
TRU CONDENSATE RECEIVER	PROCESS CELL	1	3000 GAL 1400	8' DIA X 10' HIGH	STAINLESS STEEL	303 * $\left(\frac{1400}{3000}\right)^3 = 192$
TRU CONDENSATE RECVR COOLING COIL						68
TRU CONDENSATE RECEIVER TRANSFER PUMP A	PROCESS CELL	1				123
TRU CONDENSATE RECEIVER AGITATOR A	PROCESS CELL	1				253
REGENERATION WASTE TANK	PROCESS CELL	1	1000 GAL 500	4' DIA X 10' HIGH	STAINLESS STEEL	232 * $\left(\frac{500}{1000}\right)^3 = 153$
REGENEFTN WSTE TK COOLING COIL						68
PHF FILTER A	PROCESS CELL	1	20 GPM	2' D X 8' LONG	STAINLESS STEEL	316
PHF FILTER B	PROCESS CELL	1	20 GPM	2' D X 8' LONG	STAINLESS STEEL	316
PRECONDAT FEED TANK	PROCESS CELL	1	1000 GAL	4' D X 10' H	STAINLESS STEEL	232
PRECONDAT FEED TANK COOLING COIL						68
PRECONDAT FEED TANK TRANSFER PUMP A	PROCESS CELL	1				123
PRECONDAT FEED TANK AGITATOR A	PROCESS CELL	1				253
PHF FILTER A	PROCESS CELL	1	20 GPM	2' D X 8' LONG	STAINLESS STEEL	316
PHF FILTER B	PROCESS CELL	1	20 GPM	2' D X 8' LONG	STAINLESS STEEL	316
PHF FILTER C	PROCESS CELL	1	20 GPM	2' D X 8' LONG	STAINLESS STEEL	316
PHF FILTER D	PROCESS CELL	1	20 GPM	2' D X 8' LONG	STAINLESS STEEL	316
PHF FILTER E	PROCESS CELL	1	20 GPM	2' D X 8' LONG	STAINLESS STEEL	316
PHF FILTER F	PROCESS CELL	1	20 GPM	2' D X 8' LONG	STAINLESS STEEL	316
PHF FILTER G	PROCESS CELL	1	20 GPM	2' D X 8' LONG	STAINLESS STEEL	316
PHF FILTER H	PROCESS CELL	1	20 GPM	2' D X 8' LONG	STAINLESS STEEL	316
PHF FILTER I	PROCESS CELL	1	20 GPM	2' D X 8' LONG	STAINLESS STEEL	316
PHF FILTER J	PROCESS CELL	1	20 GPM	2' D X 8' LONG	STAINLESS STEEL	316
PHF FILTER K	PROCESS CELL	1	20 GPM	2' D X 8' LONG	STAINLESS STEEL	316
PHF FILTER L	PROCESS CELL	1	20 GPM	2' D X 8' LONG	STAINLESS STEEL	316
PHF FILTER M	PROCESS CELL	1	20 GPM	2' D X 8' LONG	STAINLESS STEEL	316
PHF FILTER N	PROCESS CELL	1	20 GPM	2' D X 8' LONG	STAINLESS STEEL	316
PHF FILTER O	PROCESS CELL	1	20 GPM	2' D X 8' LONG	STAINLESS STEEL	316
PHF FILTER P	PROCESS CELL	1	20 GPM	2' D X 8' LONG	STAINLESS STEEL	316
PHF FILTER Q	PROCESS CELL	1	20 GPM	2' D X 8' LONG	STAINLESS STEEL	316
PHF FILTER R	PROCESS CELL	1	20 GPM	2' D X 8' LONG	STAINLESS STEEL	316
PHF FILTER S	PROCESS CELL	1	20 GPM	2' D X 8' LONG	STAINLESS STEEL	316
PHF FILTER T	PROCESS CELL	1	20 GPM	2' D X 8' LONG	STAINLESS STEEL	316
PHF FILTER U	PROCESS CELL	1	20 GPM	2' D X 8' LONG	STAINLESS STEEL	316
PHF FILTER V	PROCESS CELL	1	20 GPM	2' D X 8' LONG	STAINLESS STEEL	316
PHF FILTER W	PROCESS CELL	1	20 GPM	2' D X 8' LONG	STAINLESS STEEL	316
PHF FILTER X	PROCESS CELL	1	20 GPM	2' D X 8' LONG	STAINLESS STEEL	316
PHF FILTER Y	PROCESS CELL	1	20 GPM	2' D X 8' LONG	STAINLESS STEEL	316
PHF FILTER Z	PROCESS CELL	1	20 GPM	2' D X 8' LONG	STAINLESS STEEL	316

ITEM	LOCATION	QTY	CAPACITY	DIMENSION	MATERIAL	1988 \$ (\$ x 1000)
WAS SCRUBBER CONDENSER	PROCESS CELL	1	500 GPM	12' X 12' X 8' H	STAINLESS STEEL	340
WAS SLEAK CONTACT REC. TANK					STEEL	62
WAS SCRUBBER CONDENSER	PROCESS CELL	1				120
TRANSFER PUMP A						
WAS SCRUBBER CONDENSER	PROCESS CELL	1				250
AGITATOR A						
TRUEX EXTRACTION MODULE EXTRACT CENTRIFUGAL CONTACTORS	PROCESS CELL	1		MODULE 4' X 12' L X 8' H	STAINLESS STEEL	194
TRUEX STRIPPER MODULE STRIP CENTRIFUGAL CONTACTORS	PROCESS CELL	1		MODULE 4' X 10' L X 8' H	STAINLESS STEEL	139
TRUEX STRIPPER MODULE STRIP CENTRIFUGAL CONTACTORS	PROCESS CELL	1		MODULE 4' X 10' L X 8' H	STAINLESS STEEL	166
TRUEX SOLVENT WASH MODULE WASH CENTRIFUGAL CONTACTORS	PROCESS CELL	1		MODULE 2' X 10' L X 8' H	STAINLESS STEEL	111
WAS SOLVENT COLUMN	PROCESS CELL	1		12' X 12' X 8' H	STAINLESS STEEL	
WAS COLUMN	PROCESS CELL	1	3000 GPM	6' 0" X 15' H	STAINLESS STEEL	107
C3 CONCENTRATOR	PROCESS CELL	1	10 GPM	15' H	STAINLESS STEEL	362
C3 CONCENTRATOR CONDENSER	PROCESS CELL	1		2' 0" X 6' L	STAINLESS STEEL	316
WAS SCRUBBER SOLUTION CONCENTRATOR	PROCESS CELL	1	20 GPM	15' H	STAINLESS STEEL	314
WAS OFF-GAS SCRUBBER W/ BUBBLE-CAP TRAYS	PROCESS CELL	1		6' 0" X 12' H	STAINLESS STEEL	109
WAS SCRUBBER CONDENSER CONDENSER	PROCESS CELL	1	20 GPM	6' 0" X 12' H	STAINLESS STEEL	316
OFF-GAS HEATER	PROCESS CELL	1	1500 SCFH		STAINLESS STEEL	16
OFF-GAS FILTER	PROCESS CELL	1	1500 SCFH		STAINLESS STEEL	230
TANK JETS	PROCESS CELL	30			STAINLESS STEEL	15
SUMP	PROCESS CELL		20 GPM		STAINLESS STEEL	
TOTAL IN-CELL EQUIPMENT						2770
SCRUB SOLUTION FEED TANK	IN BLDG OUT-OF-CELL	1	500 GPM	4' 0" DIA X 5' H	STAINLESS STEEL	16
SCRUB SOLUTION FEED TANK TRANSFER PUMP A	IN BLDG OUT-OF-CELL	1				4
SCRUB SOLUTION FEED TANK AGITATOR A	IN BLDG OUT-OF-CELL	1				4
SCRUB SOLUTION FEED TANK	IN BLDG OUT-OF-CELL	1	500 GPM	4' 0" DIA X 5' H	STAINLESS STEEL	18

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ITEM	LOCATION	QTY	CAPACITY	DIMENSION	MATERIAL	
STAFF SOLUTION FEED TANK TRANSFER PUMP A	IN BLDG/OUT-OF-CELL	1				4
STEEL SOLUTION FEED TANK AGITATOR A	IN BLDG/OUT-OF-CELL	1				4
WASH SOLUTION FEED TANK	IN BLDG/OUT-OF-CELL	1	500 GAL	4'6" DIA X 5'H	STAINLESS STEEL	18
WASH SOLUTION FEED TANK TRANSFER PUMP A	IN BLDG/OUT-OF-CELL	1				4
WASH SOLUTION FEED TANK AGITATOR A	IN BLDG/OUT-OF-CELL	1				4
SOLVENT MAKEUP TANK	IN BLDG/OUT-OF-CELL	1	500 GAL	4'6" DIA X 5'H	STAINLESS STEEL	18
SOLVENT MAKEUP TANK TRANSFER PUMP A	IN BLDG/OUT-OF-CELL	1				4
SOLVENT MAKEUP TANK AGITATOR A	IN BLDG/OUT-OF-CELL	1				4
IX REGENERATION MAKEUP TANK	IN BLDG/OUT-OF-CELL	1	500 GAL	4'6" DIA X 5'H	STAINLESS STEEL	18
IX REGENERATION MAKEUP TANK TRANSFER PUMP A	IN BLDG/OUT-OF-CELL	1				4
IX REGENERATION MAKEUP TANK AGITATOR A	IN BLDG/OUT-OF-CELL	1				4
0.1N NITRIC ACID ADDITION TANK	IN BLDG/OUT-OF-CELL	1	500 GAL	4'6" DIA X 5'H	STAINLESS STEEL	18
0.1N NITRIC ACID ADDITION TANK TRANSFER PUMP A	IN BLDG/OUT-OF-CELL	1				4
0.1N NITRIC ACID ADDITION TANK AGITATOR A	IN BLDG/OUT-OF-CELL	1				4
0.3N NITRIC ACID ADDITION TANK	IN BLDG/OUT-OF-CELL	1	500 GAL	4'6" DIA X 5'H	STAINLESS STEEL	18
0.3N NITRIC ACID ADDITION TANK TRANSFER PUMP A	IN BLDG/OUT-OF-CELL	1				4
0.3N NITRIC ACID ADDITION TANK AGITATOR A	IN BLDG/OUT-OF-CELL	1				4
0.5N SODIUM HYDROXIDE ADDITION TANK	IN BLDG/OUT-OF-CELL	1	500 GAL	4'6" DIA X 5'H	STAINLESS STEEL	18
0.5N SODIUM HYDROXIDE ADDITION TANK - PUMP A	IN BLDG/OUT-OF-CELL	1				4
0.5N SODIUM HYDROXIDE ADDITION TANK - AGITATOR A	IN BLDG/OUT-OF-CELL	1				4
0.5N SODIUM HYDROXIDE ADDITION TANK	IN BLDG/OUT-OF-CELL	1				4
0.5N SODIUM HYDROXIDE ADDITION TANK - TRANSFER PUMP A	IN BLDG/OUT-OF-CELL	1				4
0.5N SODIUM HYDROXIDE ADDITION TANK - AGITATOR A	IN BLDG/OUT-OF-CELL	1				4
PRE-COAST FEED TANK	IN BLDG/OUT-OF-CELL	1	500 GAL	4'6" DIA X 5'H	STAINLESS STEEL	18

ITEM	LOCATION	QTY	CAPACITY	DIMENSION	MATERIAL	1992 \$ \$: 1960 :
PRE-CLAY FEED TANK TRANSFER PUMP A	IN BLDG/OUT-OF-CELL	1				1
PRE-CLAY FEED TANK AGITATOR A	IN BLDG/OUT-OF-CELL	1				1
SEA NITRIC ACID ADDITION TANK	IN BLDG/OUT-OF-CELL	1	500 GAL	4' 6" DIA X 5' H	STAINLESS STEEL	18
TAN NITRIC ACID ADDITION TANK TRANSFER PUMP A	IN BLDG/OUT-OF-CELL	1				1
SEA NITRIC ACID ADDITION TANK AGITATOR A	IN BLDG/OUT-OF-CELL	1				1
PEROXIDE FEED TANK	IN BLDG/OUT-OF-CELL	1	500 GAL	4' 6" DIA X 5' H	STAINLESS STEEL	18
PEROXIDE FEED TANK TRANSFER PUMP A	IN BLDG/OUT-OF-CELL	1				1
PEROXIDE FEED TANK AGITATOR A	IN BLDG/OUT-OF-CELL	1				1
SLUDGE RECEIVER SODIUM NITRITE ADDITION TANK	IN BLDG/OUT-OF-CELL	1	500 GAL	4' 6" DIA X 5' H	STAINLESS STEEL	18
SLUDGE RECEIVER SODIUM NITRITE ADDITION TANK-AGITATOR A	IN BLDG/OUT-OF-CELL	1				1
SLUDGE RECEIVER SODIUM NITRITE ADDITION TANK-AGITATOR A	IN BLDG/OUT-OF-CELL	1				1
LOW LEVEL WASTE TANK SODIUM NITRITE ADDITION TANK	IN BLDG/OUT-OF-CELL	1	500 GAL	4' 6" DIA X 5' H	STAINLESS STEEL	18
LOW LEVEL WASTE TANK SODIUM NITRITE ADDN TK-TRANSFER PUMP A	IN BLDG/OUT-OF-CELL	1				1
LOW LEVEL WASTE TANK SODIUM NITRITE ADDN TANK-AGITATOR A	IN BLDG/OUT-OF-CELL	1				1
IX MAKEUP TANK (CS)	IN BLDG/OUT-OF-CELL	1	500 GAL	4' 6" DIA X 5' H	STAINLESS STEEL	18
IX MAKEUP TANK (CS) TRANSFER PUMP A	IN BLDG/OUT-OF-CELL	1				1
IX MAKEUP TANK (CS) AGITATOR A	IN BLDG/OUT-OF-CELL	1				1
OFF-GAS TREATMENT SODIUM NITRITE TANK	IN BLDG/OUT-OF-CELL	1	500 GAL	4' 6" DIA X 5' H	STAINLESS STEEL	18
OFF-GAS TREATMENT SODIUM NITRITE TANK - TRANSFER PUMP A	IN BLDG/OUT-OF-CELL	1				1
OFF-GAS TREATMENT SODIUM NITRITE TANK - AGITATOR A	IN BLDG/OUT-OF-CELL	1				1
UTILITY TANK	IN BLDG/OUT-OF-CELL	1	500 GAL	4' 6" DIA X 5' H	STAINLESS STEEL	18
UTILITY TANK TRANSFER PUMP A	IN BLDG/OUT-OF-CELL	1				1
UTILITY TANK AGITATOR A	IN BLDG/OUT-OF-CELL	1				1
IX MAKEUP TANK	IN BLDG/OUT-OF-CELL	1	500 GAL	4' 6" DIA X 5' H	STAINLESS STEEL	18
IX MAKEUP TANK TRANSFER PUMP A	IN BLDG/OUT-OF-CELL	1				1

ITEM	LOCATION	QTY	CAPACITY	DIMENSION	MATERIAL	1982 \$ (\$ x 1000)
17. ACID/OUT TANK AGITATOR A	IN BLDG/OUT-OF-CELL	1				4
18. ELUANT ADDITION TANK	IN BLDG/OUT-OF-CELL	1	500 GAL	17'6" DIA X 5' H	STAINLESS STEEL	18
19. ELUANT ADDITION TANK TRANSFER PUMP A	IN BLDG/OUT-OF-CELL	1				4
20. ELUANT ADDITION TANK AGITATOR A	IN BLDG/OUT-OF-CELL	1				4
TOTAL COLD CHEMICAL IN BLDG						
21. NITRIC ACID STORAGE TANK	NOT IN BLDG/ OUT-OF-CELL	4	20000 GAL	15'0" DIA X 15'6" HIGH	STAINLESS STEEL	494
22. NITRIC ACID STORAGE TANK TRANSFER PUMP A	NOT IN BLDG/ OUT-OF-CELL	1				21
23. SODIUM HYDROXIDE STORAGE TANK	NOT IN BLDG/ OUT-OF-CELL	3	20000 GAL	15'0" DIA X 15'6" HIGH	CARBON STEEL	121
24. SODIUM HYDROXIDE STRG TANK TRANSFER PUMP A	NOT IN BLDG/ OUT-OF-CELL	3				15
25. HYDROGEN PEROXIDE STORAGE TK	NOT IN BLDG/ OUT-OF-CELL	12	20000 GAL	9'0" DIA X 40' LONG	ALUMINUM	349
26. HYDROGEN PEROXIDE STORAGE TK TRANSFER PUMP A	NOT IN BLDG/ OUT-OF-CELL	12				62
27. SCALD SOLUTION MIX TANK	NOT IN BLDG/ OUT-OF-CELL	1	2000 GAL	7'0" DIA X 7'0" HIGH	STAINLESS STEEL	18
28. SCALD SOLUTION MIX TANK TRANSFER PUMP A	NOT IN BLDG/ OUT-OF-CELL	1				6
29. SCALD SOLUTION MIX TANK AGITATOR A	NOT IN BLDG/ OUT-OF-CELL	1				7
30. STRIP SOLUTION MIX TANK	NOT IN BLDG/ OUT-OF-CELL	1	2000 GAL	7'0" DIA X 7'0" HIGH	STAINLESS STEEL	18
31. STRIP SOLUTION MIX TANK TRANSFER PUMP A	NOT IN BLDG/ OUT-OF-CELL	1				6
32. STRIP SOLUTION MIX TANK AGITATOR A	NOT IN BLDG/ OUT-OF-CELL	1				7
33. WASH SOLUTION MIX TANK	NOT IN BLDG/ OUT-OF-CELL	1	2000 GAL	7'0" DIA X 7'0" HIGH	STAINLESS STEEL	18
34. WASH SOLUTION MIX TANK TRANSFER PUMP A	NOT IN BLDG/ OUT-OF-CELL	1				6
35. WASH SOLUTION MIX TANK AGITATOR A	NOT IN BLDG/ OUT-OF-CELL	1				7
36. RPH RECEIPT/STORAGE TANK	NOT IN BLDG/ OUT-OF-CELL	1	2000 GAL	7'0" DIA X 7'0" HIGH	STAINLESS STEEL	18
37. RPH RECEIPT/STORAGE TANK TRANSFER PUMP A	NOT IN BLDG/ OUT-OF-CELL	1				6
38. RPH RECEIPT/STORAGE TANK	NOT IN BLDG/ OUT-OF-CELL	1	2000 GAL	7'0" DIA X 7'0" HIGH	STAINLESS STEEL	18
39. RPH RECEIPT/STORAGE TANK TRANSFER PUMP A	NOT IN BLDG/ OUT-OF-CELL	1				6

ITEM	LOCATION	QTY	CAPACITY	DIMENSION	MATE
CH2S MIX TANK	NOT IN BLDG/ OUT-OF-CELL	1	500 GAL	4' 6" X 5' 0"	STAINL STEEL
CH2O MIX TANK/ TRANSFER PUMP A	NOT IN BLDG/ OUT-OF-CELL	1			
CH2O MIX TANK/ AGITATOR A	NOT IN BLDG/ OUT-OF-CELL	1			
SOLVENT MIX TANK	NOT IN BLDG/ OUT-OF-CELL	1	500 GAL	4' 6" X 5' 0"	STAINL STEEL
SOLVENT MIX TANK/ TRANSFER PUMP A	NOT IN BLDG/ OUT-OF-CELL	1			
SOLVENT MIX TANK/ AGITATOR A	NOT IN BLDG/ OUT-OF-CELL	1			
NITRIC ACID DILUTION TANK	NOT IN BLDG/ OUT-OF-CELL	3	500 GAL	4' 6" X 5' 0"	STAINL STEEL
NITRIC ACID DILUTION TANK/ TRANSFER PUMP A	NOT IN BLDG/ OUT-OF-CELL	3			
NITRIC ACID DILUTION TANK/ AGITATOR A	NOT IN BLDG/ OUT-OF-CELL	3			
SODIUM HYDROXIDE DILUTION TANK	NOT IN BLDG/ OUT-OF-CELL	2	500 GAL	4' 6" X 5' 0"	STAINL STEEL
SODIUM HYDROXIDE DILUTION TANK/ TRANSFER PUMP A	NOT IN BLDG/ OUT-OF-CELL	2			
SODIUM HYDROXIDE DILUTION TANK/ AGITATOR A	NOT IN BLDG/ OUT-OF-CELL	2			
SODIUM NITRITE MIX TANK	NOT IN BLDG/ OUT-OF-CELL	1	500 GAL	4' 6" X 5' 0"	STAINL STEEL
SODIUM NITRITE MIX TANK/ TRANSFER PUMP A	NOT IN BLDG/ OUT-OF-CELL	1			
SODIUM NITRITE MIX TANK/ AGITATOR A	NOT IN BLDG/ OUT-OF-CELL	1			
PRECIPIT MIX TANK	NOT IN BLDG/ OUT-OF-CELL	1	500 GAL	4' 6" X 5' 0"	STAINL STEEL
PRECIPIT MIX TANK/ TRANSFER PUMP A	NOT IN BLDG/ OUT-OF-CELL	1			
PRECIPIT MIX TANK/ AGITATOR A	NOT IN BLDG/ OUT-OF-CELL	1			
TOTAL COLD CHEMICAL OUT OF BLDG					
RES MAINTENANCE EQUIPMENT	RES MAINT SHOP	LOT			
NON-RES MAINTENANCE EQUIPMENT	NON-RES SHOP	LOT			
MSM REPAIR EQUIPMENT	MSM REPAIR	LOT			
TOTAL REGULATED, NON-REGULATED & MSM REPAIR					

RECEIVED

ITEM	LOCATION	QTY	CAPACITY	DIMENSION	MATERIAL	1985 \$ 15 x 1000
ONE-STEP TRANSFER SYSTEM	ANALYTICAL CELLS	1		2'	STAINLESS STEEL	1,140
WASTE BLEND BOX	ASH REPAIR	1			STAINLESS STEEL	75
ASH RECON EQUIPMENT		LOT				55
TOTAL EQUIPMENT RECON REPAIR & MAINTENANCE						
TRANSFER DRAWERS	SAMPLE/ANALYT ROOM	1		2' x 2' x 2'	STAINLESS STEEL	1,770
SAMPLE MODULES	SAMPLE CELLS	35	15 KL		STAINLESS STEEL	2,205
TOTAL PROCESS SAMPLING						
HOT LAB EQUIPMENT	HOT LAB	LOT			STAINLESS STEEL	2,393
COLD LAB EQUIPMENT	COLD LAB	LOT				103
TOTAL ANALYTICAL FACILITIES						
CRANE	CANYON/CUT-UP CELL	1	30 TON	73' x 11' x 20'	CARBON STEEL	1,911
60" SHIELD WINDOWS	MAINT. REMOTE CELLS	31 OK			LEAD GLASS	785
28" SHIELD WINDOWS	SAMPLE REMOTE CELLS	10			LEAD GLASS	395
MASTER SLAVE MANIPULATORS	VARIOUS REMOTE CELLS	22. MORE 7			STAINLESS STEEL	464
ELECT RECON MANIPULATORS	REMOTE MAIN CELLS	18	PAR 3000		STAINLESS STEEL	995
ASH CARTS	ASH REPAIR	1	SINGLE		CARBON STEEL	2,100
SHIELD WINDOW CART	MAINT AREA	1			CARBON STEEL	73
CONC CRANE	CONC	1	7.5 TON		CARBON STEEL	166
CRA SHIELD DOOR (HOLEY)	CRA				STAINLESS STEEL	1,218
CRANE BLOCKS, TIES, & BAILES	CANYON	LOT	30 TON		STAINLESS STEEL	653
CUT-UP ROOM EQUIPMENT	CUT-UP ROOM	LOT			STAINLESS STEEL	263
FEED REMOTE LIGHTS	FEED	4			STAINLESS STEEL	1,122
TOTAL REMOTE HANDLING EQUIPMENT						
TOTAL GRAND, ALL EQUIPMENT						

6917

58,740



From: Engineering Services W23170
Phone: 3-2955 R1-17
Date: March 30, 1989
Subject: DOCUMENTATION OF KEH DESIGN ON NEW FACILITY OPTIONS

RECEIVED

APR 10 1989

To: D. E. McKenney [REDACTED]

cc: D. E. Ball R1-17 w/o attachments
JSG File/LB

D E MCKENNEY

This letter provides back up drawings and FASTC estimates prepared by Kaiser Engineering for two new pretreatment facility options. The estimate comparisons are summarized on Page 2.

Attachment 1 the smaller throughput facility

Attachment 2 the larger throughput facility

Attachment 3 the derivation of PFM comparisons

J. S. Garfield
Principal Engineer

jg

LARGER THROUGHPUT PRETREATMENT BLDG

	FACTOR (PFM)	KEH 175000FT2(VIT BLDG	FACTOR (PFM)	KEH 175000FT2
STRUCTURAL	19.623	65700	13.643	47100
HVAC	14.67	15200	2.951	10000
ELEC/MECH	28.967	78700	47.874	124800
UTILITIES	4.367	2900	4.367	2900
MISC (EXCAVATION)	105.964	3100	105.694	3100
DIRECT CONST (89\$)		165600		187900
TOTAL SQUARE FT		175000 FT2		175000
COST/FT2		946 \$/FT2		1074
DETAILED DESIGN (22%)	22	36763	22	41714
ENG MANAGEMENT (8.4%)	8	13910	8	15784
TITLE III INSPECTION (8.0%)	8	13248	8	15032
CONST MANAGEMENT (9%)	9	14904	9	16911
PROJ MANAGEMENT(10%)	10	16560	10	18790
FY 89 TOTAL		260986		296130
ESCALATION (60%)		156591		177678
CONTINGENCY (35%)		146152		165833
TOTAL PROJECT COST		564000		640000
BUILDING VOLUME		3.5M FT3		
CONCRETE VOLUME		51000 YDS		
LINEAL FT OF CELL		636 FT		

SMALLER THROUGHPUT PRETREATMENT BLDG

	FACTOR (PFM)	KEH 132000FT2(VIT BLDG	FACTOR (PFM)	KEH 132000
STRUCTURAL	19.623	51300	13.643	36800
HVAC	4.67	11900	2.951	7800
ELEC/MECH	28.957	61300	47.874	97100
UTILITIES	4.367	2900	4.367	2900
MISC (EXCAVATION)	105.694	2400	105.694	2400
DIRECT CONST (89\$)		129800		147000
TOTAL SQUARE FT		132000 FT2		132000
COST/FT2		983 \$/FT2		1114
DETAILED DESIGN (22%)	22	28816	22	32634
ENG MANAGEMENT (8.4%)	8	10903	8	12348
TITLE III INSPECTION (8.0%)	8	10384	8	11760
CONST MANAGEMENT (9%)	9	11682	9	13230
PROJ MANAGEMENT(10%)	10	12980	10	14700
FY 89 TOTAL		204565		231672
ESCALATION (60%)		122739		139003
CONTINGENCY (35%)		114556		129736
TOTAL PROJECT COST		442000		500000
BUILDING VOLUME		2.8M FT3		
CONCRETE VOLUME		40000 YDS		
LINEAL FT OF CELL		445 FT		

PFM

VIT BLDG

FACTOR	PFM	FACTOR	VIT BLDG
	COSTS		COSTS
19.623	46200	13.643	58700
7.473	16400	2.951	11700
33.389	62100	47.874	140900
99.426	9900		
	5100		
	139700		211300
FT2	116000	FT2	185000
\$/FT2	1204	\$/FT2	1142
			\$/FT
	48		67335
	0		0
	0		0
	8		11316
	8		10589
			228940
	PFM		15200
	PFM		10800
			255000
			2.9M FT3
			33800 YDS
			325 FT

Attachment 1

Pretreatment 132,000 ft²

9
3
3
1
3
2
1
4
1
1
1

PRETREATMENT II

	AREA				VOLUME	
(-) 30'-0" Level						
. Stairwell	32	x	16	512	x	60
. Stairwell	10	x	21	210	x	60
. Stairwell	10	x	21	210	x	60
. Stairwell	10	x	21	210	x	60
. Stairwell	10	x	21	210	x	60
. Remote HEPA Crane Maint Area	42	x	23	966	x	15
. Suit Up Area	25	x	23	575	x	15
. Remote HEPA Filter Test/Monitor	44	x	15	660	x	15
. Filter Change Out Cont Room	18	x	11	198	x	15
. Air Lock/Corridor	70	x	11	770	x	15
. FECA Operating Area	34	x	25	850	x	15
. FECA Cell	39	x	25	975	x	15
. Remote HEPA Filter Area	47	x	42	1,974	x	15
.	11	x	15	165	x	15
. Hot Shop/Air Lock/Corridor	221	x	25	5,525	x	15
. Storage Maintenance	221	x	25	5,525	x	15
. Corridor/Air Lock	72	x	25	1,800	x	15
. Narrow Corridor	100	x	10	1,000	x	15
. Elevator	25	x	20	500	x	45
. Cell A	133	x	20	2,660	x	40
. Cell B	133	x	20	2,660	x	40
. Cell C	25	x	20	500	x	40
.	25	x	20	500	x	40
.	62	x	20	1,240	x	40
. Air Tunnel	161	x	12	1,932	x	6
. Closed Loop Area	161	x	12	1,932	x	12
Subtotal				34,259	FT ²	755,541 FT ³

(-) 13'-0" Level

. Primary/Secondary Steam Gen	47	x	67	3,149	x	15	47,235
	34	x	23	782	x	15	11,730
. Rail/Truck Access	74	x	25	1,850	x	31	57,350
. Sample Gallery	221	x	25	5,525	x	15	82,875
. Sample Gallery	221	x	25	5,525	x	15	82,875
. Sample Gallery	72	x	25	1,800	x	15	27,000
. Laboratory	62	x	60	3,720	x	15	55,800
. Elevator	25	x	20	500	x	45	22,500
. Elevator	32	x	16	512	x	45	23,040
. FECA Operating Area	34	x	25	850	x	15	12,750
. FECA Cell	26	x	37	962	x	15	14,430
. Hot Pipe Trench	12	x	159	1,908	x	12	22,896
. Remote HEPA Filter Room	40	x	32	1,280	x	15	19,200
Subtotal				28,363	FT ²	479,681	FT ³

(+) 4'-0" Level

. FECA Cell	26	x	37	962	x	15	14,430
. HVAC Room	67	x	47	3,149	x	15	47,235
. FECA Operating Area	34	x	25	850	x	15	12,750
. Instm/Service Gallery	221	x	25	5,525	x	15	82,875
. Instm/Service Gallery	221	x	25	5,525	x	15	82,875
. Instm/Service Gallery	72	x	25	1,800	x	15	27,000
. Control Room	128	x	21	2,688	x	15	40,320
. Office Complex	128	x	50	6,400	x	15	96,000
. HVAC Filter Room	90	x	60	5,400	x	15	81,000
. HVAC Fan Room	85	x	60	5,100	x	15	76,500
. Elect/Switchgear Room	62	x	21	1,302	x	15	19,530
. Emergency Generator	48	x	35	1,680	x	15	25,200
Subtotal				40,381	FT ²		605,715 FT ³

(+) 21'-0" Level

. Chem/Make Up Storage	221	x	25	5,525	x	15	82,875
. Chem/Make Up Strorage	221	x	25	5,525	x	15	82,875
. Crane Maintenance	64	x	20	1,280	x	35	44,800
. Canyon Deck	269	x	62	16,678	x	43	717,154
Subtotal				29,008	FT ²		927,704 FT ³

TOTALS

(-) 30'-0" Level	34,259	755,541
(-) 13'-0" Level	28,363	479,681
(+) 4'-0" Level	40,381	605,715
(+) 21'-0" Level	<u>29,008</u>	<u>927,704</u>
TOTAL	132,011 FT ²	2,768,641 (2.8m FT ³)

RDC:tst

PRETREATMENT II
(Concrete Volume)

(-) 30'-0" Level

. Floor	=	7,665.9
. Walls	=	4,398.3

(-) 13'-0" Level

. Floor	=	2,489.0
. Walls	=	4,656.2

(4) 4'-0" Level

. Floor	=	4,416.1
. Walls	=	3,668.0

(+) 21'-0" Level

. Floor	=	6,077.4
. Walls	=	6,569.4

Total

(-) 30'-0" Level	=	12,064.2
(-) 13'-0" Level	=	7,145.2
(+) 4'-0" Level	=	8,084.1
(+) 21'-0" Level	=	<u>12,646.8</u>

39,940.3 YD³

RDC:tst

KAISER ENGINEERS HANFORD
WESTINGHOUSE HANFORD COMPANY
JOB NO. ER1369

** KAISER ENGINEERS INTERACTIVE ESTIMATING **
PRETREATMENT FACILITY

PAGE 1 OF 6
DATE 03/03/89 01:19
BY F.C. DAY

KEHR01 - PROJECT COST SUMMARY

COST CODE =====	DESCRIPTION =====	ESCALATED TOTAL COST =====	CONTINGENCY % =====	TOTAL =====	TOTAL DOLLARS =====
000	ENGINEERING	74,900,000	35	26,220,000	101,120,000
460	IMPROVEMENTS TO LAND	4,250,000	35	1,490,000	5,740,000
501	BUILDINGS	246,490,000	35	86,270,000	332,760,000
	(ADJUSTED TO MEET DOE 5100.4)	-40,000		20,000	-20,000
=====					
PROJECT TOTAL		325,600,000	35	114,000,000	439,600,000

TYPE OF
ESTIMATE ROM MARCH 3, 1989

ARCHITECT
ENGINEER

OPERATING
CONTRACTOR

REMARKS:

CHECK

(ROUNDED/ADJUSTED TO THE NEAREST " 10,000 / 100,000 " - PERCENTAGES NOT RECALCULATED TO REFLECT ROUNDING)

KAISER ENGINEERS HANFORD
WESTINGHOUSE HANFORD COMPANY
JOB NO. ER1369

** KAISER ENGINEERS INTERACTIVE ESTIMATING **
PRETREATMENT FACILITY
PARAMETRIC - ROUGH ORDER OF MAGNITUDE
KEHR02 - WORK BREAKDOWN STRUCTURE SUMMARY

PAGE 2 OF 6
DATE 03/03/89 01:19
BY F.C. DAY

WBS	DESCRIPTION	ESTIMATE SUB TOTAL	OTHER INDIRECTS	SUB TOTAL	ESCALATION % TOTAL	SUB TOTAL	CONTINGENCY % TOTAL	TOTAL DOLLARS
110001	DEFINITIVE DESIGN	28800000	0	28800000	38.75	11160000	35	53946000
120001	ENGINEERING/INSPECTION	10400000	0	10400000	68.25	7098000	35	23622300
130001	ENGINEERING MANAGEMENT	10900000	0	10900000	60.05	6545450	35	23551358
SUBTOTAL 1 ENGINEERING		50100000	0	50100000	49.51	24803450	35	101119658
320001	FP CONSTRUCTION	129800000	11697000	141497000	62.50	88435625	35	310409044
330001	WHC PROJECT MANAGEMENT	13000000	0	13000000	60.05	7806500	35	28088775
SUBTOTAL 3 CONSTRUCTION		142800000	11697000	154497000	62.29	96242125	35	338497819
=====								
PROJECT TOTAL		192,900,000	11,697,000	204,597,000	59.16	121,045,575	35	439,617,476

KAISER ENGINEERS HANFORD
WESTINGHOUSE HANFORD COMPANY
JOB NO. ER1369

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** KAISER ENGINEERS INTERACTIVE ESTIMATING **
PRETREATMENT FACILITY
PARAMETRIC - ROUGH ORDER OF MAGNITUDE
KEHR03 - ESTIMATE BASIS SHEET

PAGE 3 OF 6
DATE 02/15/89 09:56
BY F.C. DAY

1. DOCUMENTS AND DRAWINGS

=====

DOCUMENTS

DRAWINGS: ES-800-1 THRU ES-800-9 & ES-800-12

2. MATERIAL PRICES

=====

UNIT COSTS REPRESENT CURRENT PRICES FOR SPECIFIED MATERIAL.

3. ESCALATION

=====

ESCALATION CALCULATED BY THE HANFORD MATERIAL & LABOR ESCALATION STUDY , JANUARY 1989.

4. ROUNDING - LINE ITEMS:

=====

U.S. DEPARTMENT OF ENERGY - DOE ORDER 5100.4 PAGE J-2 SUBPARAGRAPH (M), REQUIRES ROUNDING OF A COST ESTIMATE TO \$10,000 FOR ITEM COST AND \$100,000 FOR TOTAL COST. REFERENCE: DOE 5100.4, FIGURE I-11, DATED 10-31-84.

5. REMARKS

=====

- A. THE COST ESTIMATE WAS DEVELOPED USING THE "FASTC" PARAMETRIC CONSTRUCTION MODEL. THOSE COSTS WERE THEN PUT INTO THE IEST FORMAT FOR ADDITION OF ESCALATION, CONTINGENCY, AND SIN OFF.
- B. THE ESTIMATE ADDRESSES ONLY THE COST OF CONSTRUCTION OF A NEW BUILDING AND ASSOCIATED ITEMS, IT DOES NOT INCLUDE ANY WORK TO BE PERFORMED BY THE ONSITE CONSTRUCTION FORCES REGARDING TIE-INS OR ROUTING OF EXISTING LINES.

KAISER ENGINEERS HANFORD
WESTINGHOUSE HANFORD COMPANY
JOB NO. ER1369

**** KAISER ENGINEERS INTERACTIVE ESTIMATING ****
PRETREATMENT FACILITY
PARAMETRIC - ROUGH ORDER OF MAGNITUDE
KEHR04 - COST CODE ACCOUNT SUMMARY

PAGE 4 OF 6
DATE 03/03/89 01:19
BY F.C. DAY

COST CODE	WBS DESCRIPTION	ESTIMATE SUB TOTAL	OTHER INDIRECTS	SUB TOTAL	ESCALATION % TOTAL	SUB TOTAL	CONTINGENCY % TOTAL	TOTAL DOLLARS
=====	=====	=====	=====	=====	=====	=====	=====	=====
000 ENGINEERING								
110001	DEFINITIVE DESIGN	28800000	0	28800000	38.75	11160000	35	53946000
120001	ENGINEERING/INSPECTION	10400000	0	10400000	68.25	7098000	35	23622300
130001	ENGINEERING MANAGEMENT	10900000	0	10900000	60.05	6545450	35	23551358
TOTAL 000	ENGINEERING	50100000	0	50100000	49.51	24803450	35	101119658
460 IMPROVEMENTS TO LAND								
320001	FP CONSTRUCTION	2400000	216000	2616000	62.50	1635000	35	5738850
TOTAL 460	IMPROVEMENTS TO LAND	2400000	216000	2616000	62.50	1635000	35	5738850
501 BUILDINGS								
320001	FP CONSTRUCTION	127400000	11481000	138881000	62.50	86800625	35	304670194
330001	WHC PROJECT MANAGEMENT	13000000	0	13000000	60.05	7806500	35	28088775
TOTAL 501	BUILDINGS	140400000	11481000	151881000	62.29	94607125	35	332758969
=====								
PROJECT TOTAL		192,900,000	11,697,000	204,597,000	59.16	121,045,575	35	439,617,476

9 1 1 2 1 2 5 1 0 9 7

KAISER ENGINEERS HANFORD
WESTINGHOUSE HANFORD COMPANY
JOB NO. ER1369

** KAISER ENGINEERS INTERACTIVE ESTIMATING **
PRETREATMENT FACILITY
PARAMETRIC - ROUGH ORDER OF MAGNITUDE
KEHRO5 - ESTIMATE SUMMARY BY CSI DIVISION

PAGE 5 OF 6
DATE 03/03/89 01:19
BY F.C. DAY

CSI DIV	DESCRIPTION	ESTIMATE SUB TOTAL	OTHER INDIRECTS	SUB TOTAL	ESCALATION % TOTAL	SUB TOTAL	CONTINGENCY % TOTAL	TOTAL DOLLARS
=====	=====	=====	=====	=====	=====	=====	=====	=====
ENGINEERING								
	ENGINEERING	50100000	0	50100000	49.51 24803450	74903450	35 26216208	101119658
	TOTAL ENGINEERING	50100000	0	50100000	49.51 24803450	74903450	35 26216208	101119658
CONSTRUCTION								
02	SITEWORK	2400000	216000	2616000	62.50 1635000	4251000	35 1487850	5738850
03	CONCRETE	51300000	4617000	55917000	62.50 34948125	90865125	35 31802794	122667919
15	MECHANICAL	76100000	6864000	82964000	62.50 51852500	134816500	35 47185775	182002275
20	BURNOUT	13000000	0	13000000	60.05 7806500	20806500	35 7282275	28088775
	TOTAL CONSTRUCTION	142800000	11697000	154497000	62.29 96242125	250739125	35 87758694	338497819
PROJECT TOTAL								
		192,900,000	11,697,000	204,597,000	59.16 121,045,575	*****	35	439,617,476

Kaiser Engineers Hanford
Westinghouse Hanford Company
Job No. ER1369

9 1 1 2 1 3 1 3 0 3
** KAISER ENGINEERS INTERACTIVE ESTIMATING **
PRETREATMENT FACILITY
PARAMETRIC - ROUGH ORDER OF MAGNITUDE
KEHR07 - ONSITE INDIRECT COSTS BY WBS

PAGE 6 OF 6
DATE 03/03/89 01:20
BY F.C. DAY

WBS	DESCRIPTION	ESTIMATE SUB TOTAL	CONTRACT %	ADMINISTRATION TOTAL	BID PACK PREP.	OTHER INDIRECTS	TOTAL INDIRECTS
=====	=====	=====	=====	=====	=====	=====	=====
110001	DEFINITIVE DESIGN	28800000	0.00	0	0	0	0
120001	ENGINEERING/INSPECTION	10400000	0.00	0	0	0	0
130001	ENGINEERING MANAGEMENT	10900000	0.00	0	0	0	0
320001	FP CONSTRUCTION	129800000	9.00	11682000	15000	0	11697000
330001	WHC PROJECT MANAGEMENT	13000000	0.00	0	0	0	0
=====							
PROJECT TOTAL		192,900,000		11,682,000	15,000	0	11,697,000

KAISER ENGINEERS HANFORD
WESTINGHOUSE HANFORD COMPANY
JOB NO. ER1369

**** KAISER ENGINEERS INTERACTIVE ESTIMATING ****
PRETREATMENT FACILITY
PARAMETRIC - ROUGH ORDER OF MAGNITUDE
KEHRO8 - ESTIMATE DETAIL BY WBS / COST CODE

PAGE 0001
DATE 03/03/89 01:20
BY F.C. DAY

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB- CONTRACT	EQUIP- MENT	OH&P / B & I	TOTAL DOLLARS
110001	DEFINITIVE DESIGN										
110001.00	TECHNICAL SERVICES										
110001.0000102	DEFINITIVE DESIGN	000	1 LS	0	0	0	0	28800000	0	0	28800000

SUBTOTAL TECHNICAL SERVICES				0		0		28,800,000	0	0	
					0		0		0		28,800,000

TOTAL COST CODE 00000 WBS 110001				0		0		28,800,000	0	0	
					0		0		0		28,800,000
(ESCALATION 38.75% - CONTINGENCY 35.00%)											

TOTAL WBS 110001 DEFINITIVE DESIGN				0		0		28,800,000	0	0	
					0		0		0		28,800,000

KAISER ENGINEERS HANFORD
WESTINGHOUSE HANFORD COMPANY
JOB NO. ER1369

** KAISER ENGINEERS INTERACTIVE ESTIMATING **
PRETREATMENT FACILITY
PARAMETRIC - ROUGH ORDER OF MAGNITUDE
KEHRO8 - ESTIMATE DETAIL BY WBS / COST CODE

PAGE 0002
DATE 03/03/89 01:20
BY F.C. DAY

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	HANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB- CONTRACT	EQUIP- MENT	OH&P / B & I	TOTAL DOLLARS
120001	ENGINEERING/INSPECTION										
120001.00	TECHNICAL SERVICES										
120001.0000100	ENGINEERING/INSPECTION	000	1 LS	0	0	0	0	10400000	0	0	10400000
SUBTOTAL TECHNICAL SERVICES				0	0	0	10,400,000	0	0	10,400,000	
TOTAL COST CODE 00000 WBS 120001				0	0	0	10,400,000	0	0	10,400,000	
(ESCALATION 68.25% - CONTINGENCY 35.00%)											
TOTAL WBS 120001 ENGINEERING/INSPECTION				0	0	0	10,400,000	0	0	10,400,000	

KAISER ENGINEERS HANFORD
WESTINGHOUSE HANFORD COMPANY
JOB NO. ER1369

** KAISER ENGINEERS INTERACTIVE ESTIMATING **
PRETREATMENT FACILITY
PARAMETRIC - ROUGH ORDER OF MAGNITUDE
KEHRO8 - ESTIMATE DETAIL BY WBS / COST CODE

PAGE 0003
DATE 03/03/89 01:20
BY F.C. DAY

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB- CONTRACT	EQUIP- MENT	OH&P / B & I	TOTAL DOLLARS
130001	ENGINEERING MANAGEMENT										
130001.00	TECHNICAL SERVICES										
130001.0000100	ENGINEERING MANAGMENT	000	1 LS	0	0	0	0	10900000	0	0	10900000
SUBTOTAL TECHNICAL SERVICES				0	0	0	0	10,900,000	0	0	10,900,000
TOTAL COST CODE 00000 WBS 130001				0	0	0	0	10,900,000	0	0	10,900,000
(ESCALATION 60.05% - CONTINGENCY 35.00%)											
TOTAL WBS 130001 ENGINEERING MANAGEMENT				0	0	0	0	10,900,000	0	0	10,900,000

PAGE 0004
DATE 03/03/89 01:20
BY F.C. DAY

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB- CONTRACT	EQUIP- MENT	OH&P / B & I	TOTAL DOLLARS
320001	FP CONSTRUCTION										
320001.02	SITEWORK										
320001.0200100	EXCAVATION - INCLS. THE COST FOR CLEARING & GRUBBING OF SITE, EXCAVATION AND	460	1 LS	0	0	0	0	0	0	0	0
320001.0200102	BACKFILL FOR THE BUILDING	460	1 LS	0	0	0	0	2400000	0	0	2400000
SUBTOTAL SITEWORK				0	0	0	0	2,400,000	0	0	2,400,000
TOTAL COST CODE 46002 WBS 320001				0	0	0	0	2,400,000	0	0	2,400,000
(ESCALATION 62.50% - CONTINGENCY 35.00%)											
320001.03	CONCRETE										
320001.0300100	STRUCTURE COST - INCLS. THE EXTERNAL STRUCTURE(WALL FACES, ROOFING, CONNECTING WALLS	501	1 LS	0	0	0	0	0	0	0	0
320001.0300102	WINDOWS), SUPERSTRUCTURE, & INTERNAL STRUCTURE(WALLS, CEILINGS,FLOORS,DOORS,ETC.)	501	1 LS	0	0	0	0	51300000	0	0	51300000
SUBTOTAL CONCRETE				0	0	0	0	51,300,000	0	0	51,300,000
TOTAL COST CODE 50103 WBS 320001				0	0	0	0	51,300,000	0	0	51,300,000
(ESCALATION 62.50% - CONTINGENCY 35.00%)											

KAISER ENGINEERS HANFORD
WESTINGHOUSE HANFORD COMPANY
JOB NO. ER1369

** KAISER ENGINEERS INTERACTIVE ESTIMATING **
PRETREATMENT FACILITY
PARAMETRIC - ROUGH ORDER OF MAGNITUDE
KEHR08 - ESTIMATE DETAIL BY WBS / COST CODE

PAGE 0005
DATE 03/03/89 01:20
BY F.C. DAY

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB- CONTRACT	EQUIP- MENT	OH&P / B & I	TOTAL DOLLARS
320001.15	MECHANICAL										
320001.1500100	HVAC - INCLS. COST FOR THE HEATING, VENTILATING, AIR CONDITIONING, & CONTROLS)	501	1 LS	0	0	0	0	11900000	0	0	11900000
320001.1500200	ELECTROMECHANICAL - INCLS. THE COST FOR ELECTRICAL, PLUMBING, PIPING, FIRE	501	1 LS	0	0	0	0	0	0	0	0
320001.1500202	PROTECTION, MECHANICAL EQUIPMENT, & INSTRUMENTATION	501	1 LS	0	0	0	0	61300000	0	0	61300000
320001.1500300	UTILITIES - INCLS THE COST FOR RR TRACK SPUR, 10 OUTSIDE STORAGE TANKS W/CONCRETE	501	1 LS	0	0	0	0	0	0	0	0
320001.1500302	PAD AND DIKE, MECHANICAL PIPING & EQUIP., INSTRUMEN- TATION, & PAVING	501	1 LS	0	0	0	0	2900000	0	0	2900000
SUBTOTAL MECHANICAL				0	0	0	0	76,100,000	0	0	76,100,000
TOTAL COST CODE 50115 WBS 320001				0	0	0	0	76,100,000	0	0	76,100,000
(ESCALATION 62.50% - CONTINGENCY 35.00%)											
TOTAL WBS 320001 FP CONSTRUCTION				0	0	0	0	129,800,000	0	0	129,800,000

**** KAISER ENGINEERS INTERACTIVE ESTIMATING ****
PRETREATMENT FACILITY
PARAMETRIC - ROUGH ORDER OF MAGNITUDE
KEHR08 - ESTIMATE DETAIL BY WBS / COST CODE

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB- CONTRACT	EQUIP- MENT	OH&P / B & I	TOTAL DOLLARS
330001	WHC PROJECT MANAGEMENT										
330001.20	BURNOUT										
330001.2000100	WHC PROJECT MANAGEMENT	501	1 LS	0	0	0	0	13000000	0	0	13000000
SUBTOTAL BURNOUT				0		0		13,000,000		0	
					0		0		0		13,000,000
TOTAL COST CODE 50120 WBS 330001				0		0		13,000,000		0	
					0		0		0		13,000,000
(ESCALATION 60.05% - CONTINGENCY 35.00%)											
TOTAL WBS 330001 WHC PROJECT MANAGEMENT				0		0		13,000,000		0	
					0		0		0		13,000,000

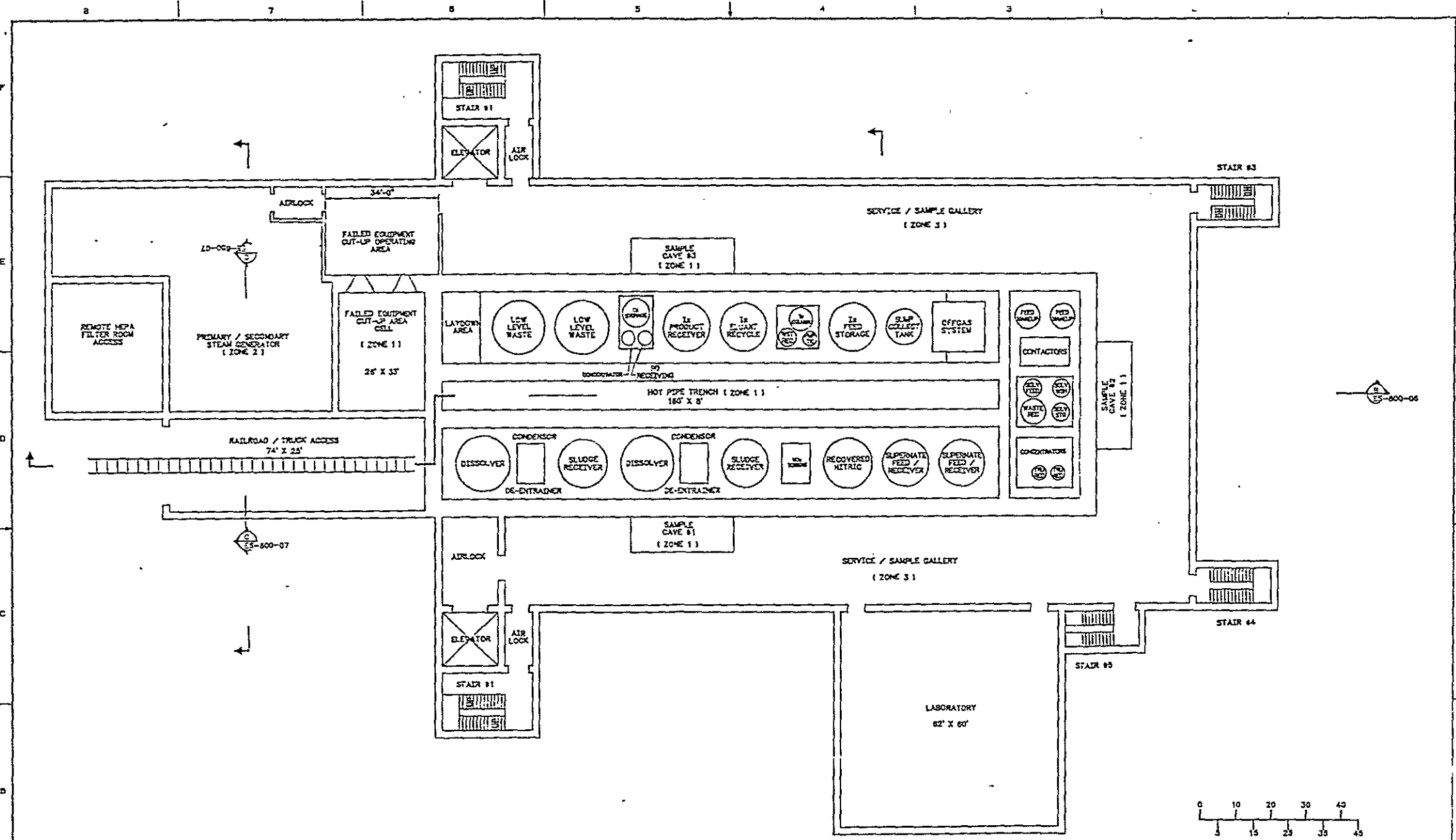
7 1 1 2 1 1 0 5

KAISER ENGINEERS HANFORD
WESTINGHOUSE HANFORD COMPANY
JOB NO. ER1369

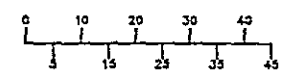
** KAISER ENGINEERS INTERACTIVE ESTIMATING **
PRETREATMENT FACILITY
PARAMETRIC - ROUGH ORDER OF MAGNITUDE
KEHR08 - ESTIMATE DETAIL BY WBS / COST CODE

PAGE 0007
DATE 03/03/89 01:20
BY F.C. DAY

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB- CONTRACT	EQUIP- MENT	OH&P / B & I	TOTAL DOLLARS
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
REPORT TOTAL				0	0	0	192,900,000 0		0		0 192,900,000



PLAN VIEW #2 (-113'-0")
SCALE: 1/8" = 1'-0"



PRELIMINARY

NOT APPROVED FOR CONSTRUCTION

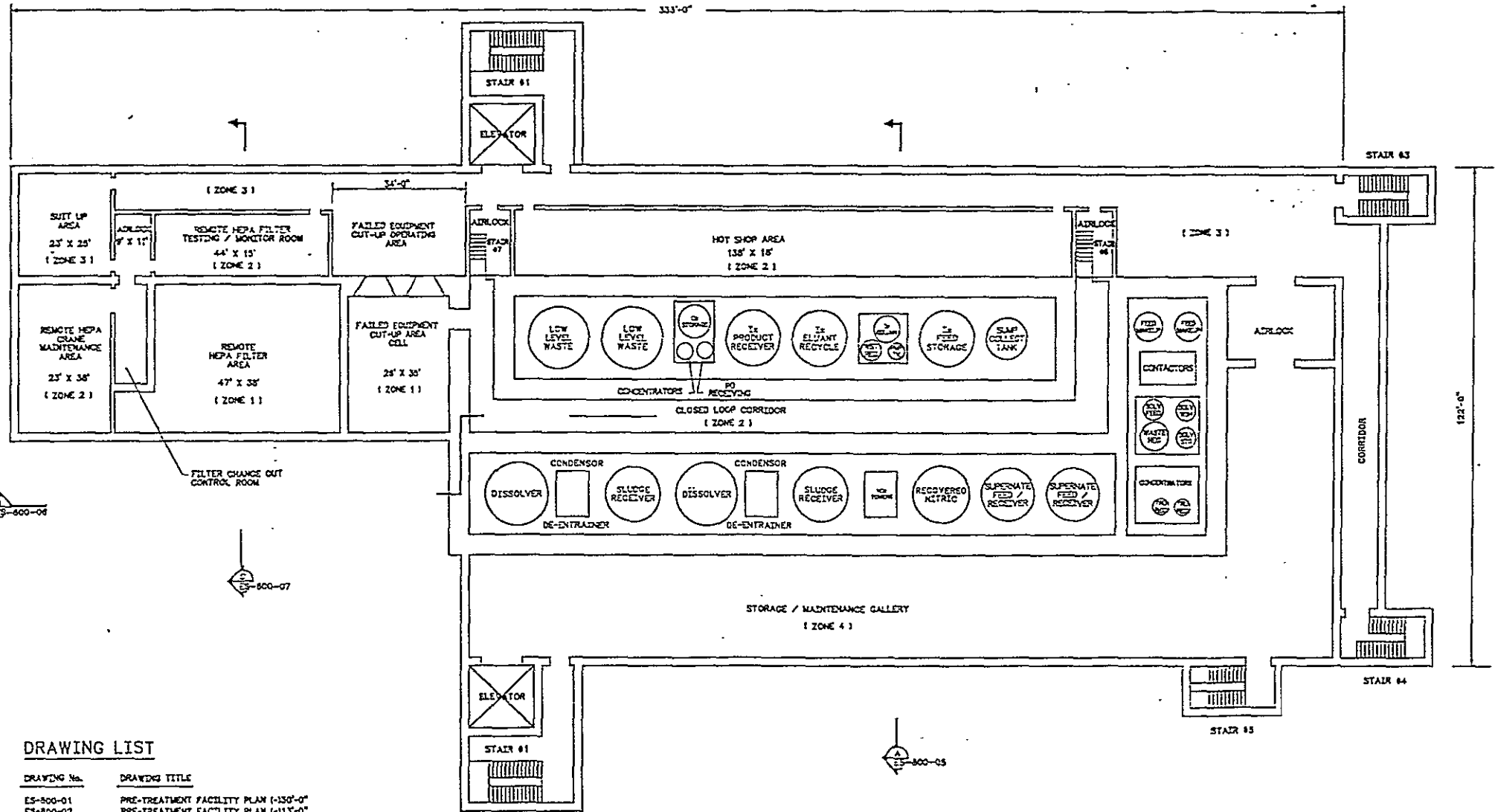
U.S. DEPARTMENT OF ENERGY
RICHLAND OPERATIONS OFFICE
KAISER ENGINEERS HANFORD COMPANY

**PRE-TREATMENT
FACILITY
PLAN (-113'-0")**

DESIGNED BY	SA GREGG	DATE	2/4/80
CHECKED BY		DATE	
APPROVED BY		DATE	
PROJECT NO.	ES-1369	REV	24-4800
PROJECT TITLE	HWPV PRE-TREATMENT FACILITY		
SCALE	1/8" = 1'-0"	DATE	

NO.	BY DATE	BY DATE	REV BY DATE	DESCRIPTION	REV BY DATE
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					

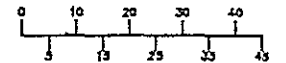
9 1 1 2 1 3 1 7 0 7



DRAWING LIST

DRAWING No.	DRAWING TITLE
ES-800-01	PRE-TREATMENT FACILITY PLAN (-130'-0")
ES-800-02	PRE-TREATMENT FACILITY PLAN (-113'-0")
ES-800-03A	PRE-TREATMENT FACILITY PLAN (+) 4'-0"
ES-800-03B	PRE-TREATMENT FACILITY PLAN (+) 4'-0" (OFFICE COMPLEX)
ES-800-04	PRE-TREATMENT FACILITY PLAN (+) 21'-0"
ES-800-05	BUILDING ELEVATION - SECTION A
ES-800-06	BUILDING ELEVATION - SECTION B
ES-800-07	BUILDING ELEVATION - SECTION C
ES-800-08	PRE-TREATMENT FACILITY COLD CHEMICAL SUPPLY AREA

PLAN VIEW #1 (-130'-0")
SCALE: 1/8"=1'-0"



PRELIMINARY

NOT APPROVED FOR CONSTRUCTION

U.S. DEPARTMENT OF ENERGY
RICHMOND OPERATIONS OFFICE
KAISER ENGINEERS MANFORD COMPANY

PROJECT TITLE
PRE-TREATMENT FACILITY
PLAN (-130'-0")

PROJECT NO.
ER-1269

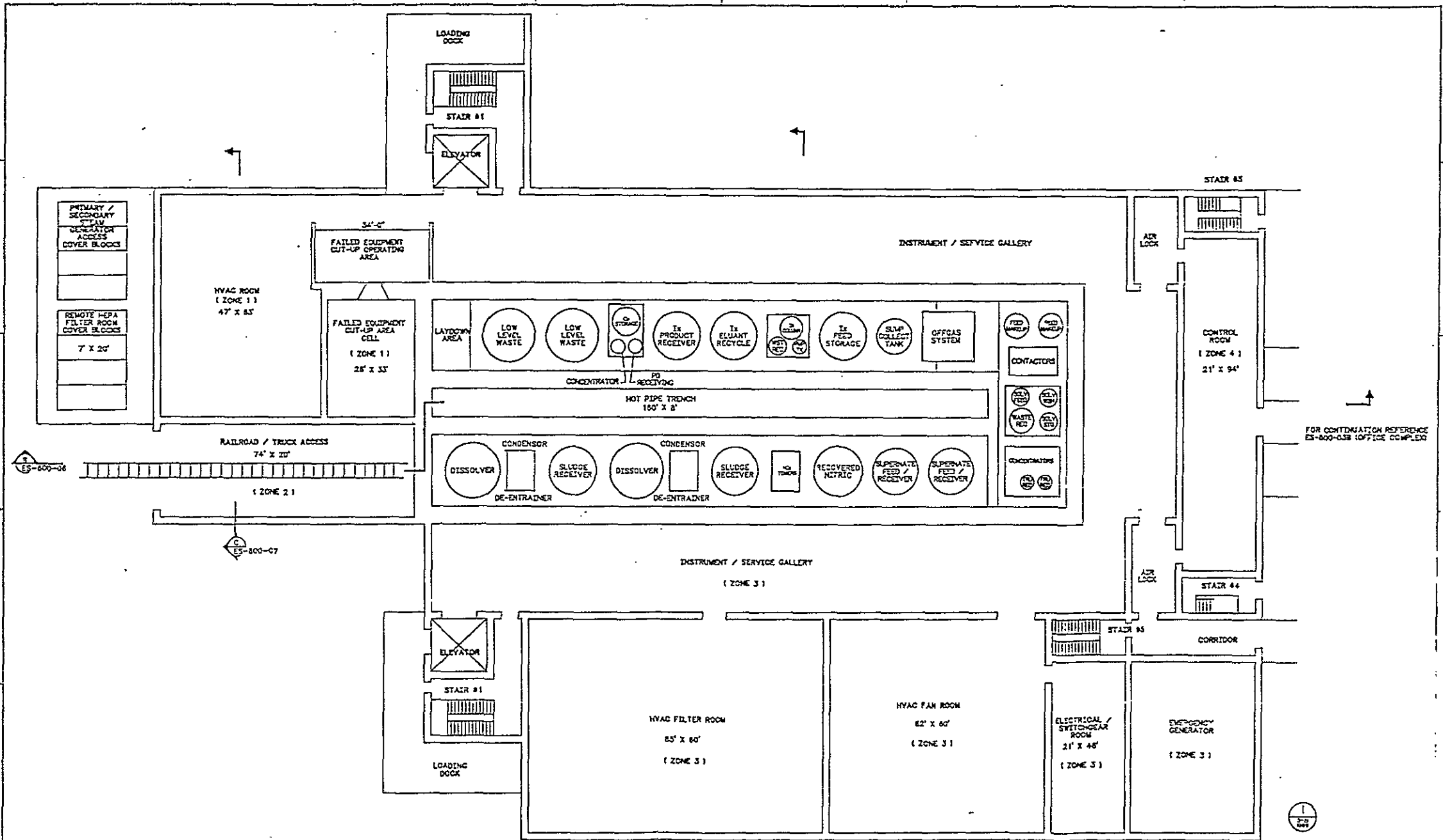
DATE
24 JUN 80

BY
SA GREGG

BY
RD CAMPBELL

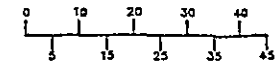
ES-800-01A 11110

NUMBER	TITLE	NUMBER	TITLE
1	DRAWING LIST	1	DRAWING LIST
2	REFERENCE	2	REFERENCE
3	DESCRIPTION	3	DESCRIPTION
4	REVISIONS	4	REVISIONS
5	REVISIONS	5	REVISIONS
6	REVISIONS	6	REVISIONS
7	REVISIONS	7	REVISIONS
8	REVISIONS	8	REVISIONS
9	REVISIONS	9	REVISIONS
10	REVISIONS	10	REVISIONS



PLAN VIEW #3 (+) 4'-0"

SCALE: 1/8" = 1'-0"



PRELIMINARY

NOT APPROVED FOR CONSTRUCTION

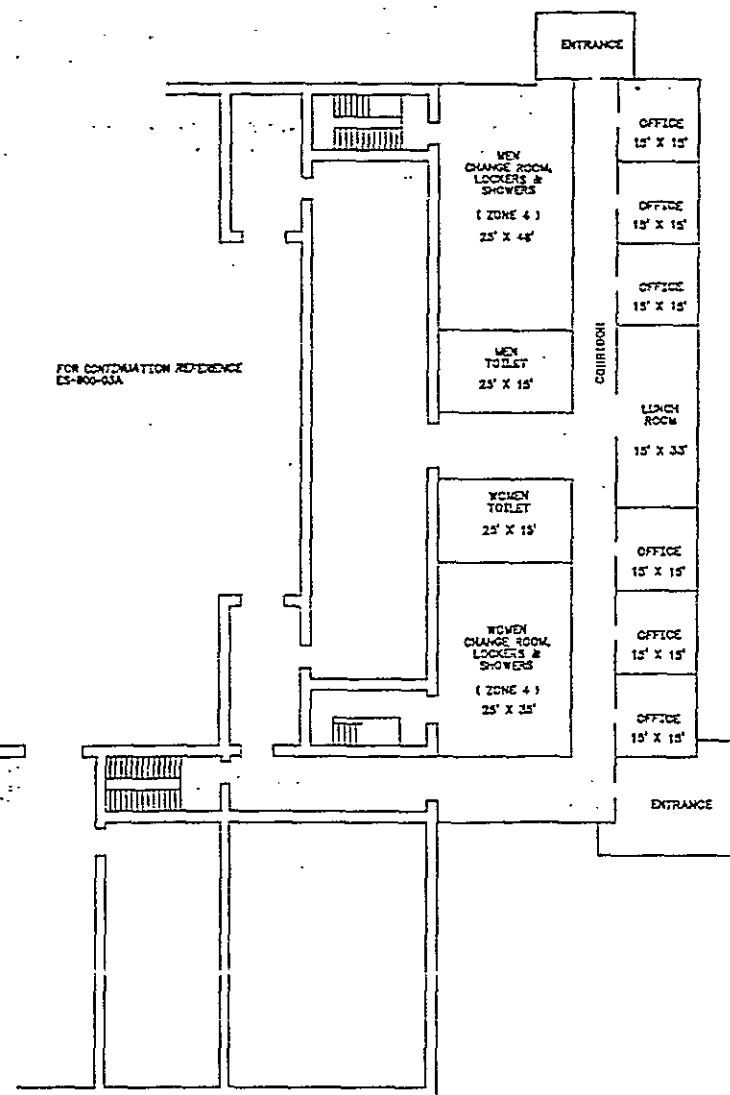
U.S. DEPARTMENT OF ENERGY
RICHLAND OPERATIONS OFFICE
KAISER ENGINEERS HANFORD COMPANY

PRE-TREATMENT FACILITY
PLAN (+) 4'-0"

PROJECT: HWVW PRE-TREATMENT FACILITY
FILE: ER-1388
JOB: 244800

DATE: 11/1/70
BY: SA CREGG
CHECKED: [Signature]

NO.	BY	DATE	DESCRIPTION
1	SA CREGG	11/1/70	DESIGN



PLAN VIEW #3 (+) 4'-0" (OFFICE COMPLEX)
SCALE: 1/4" = 1'-0"

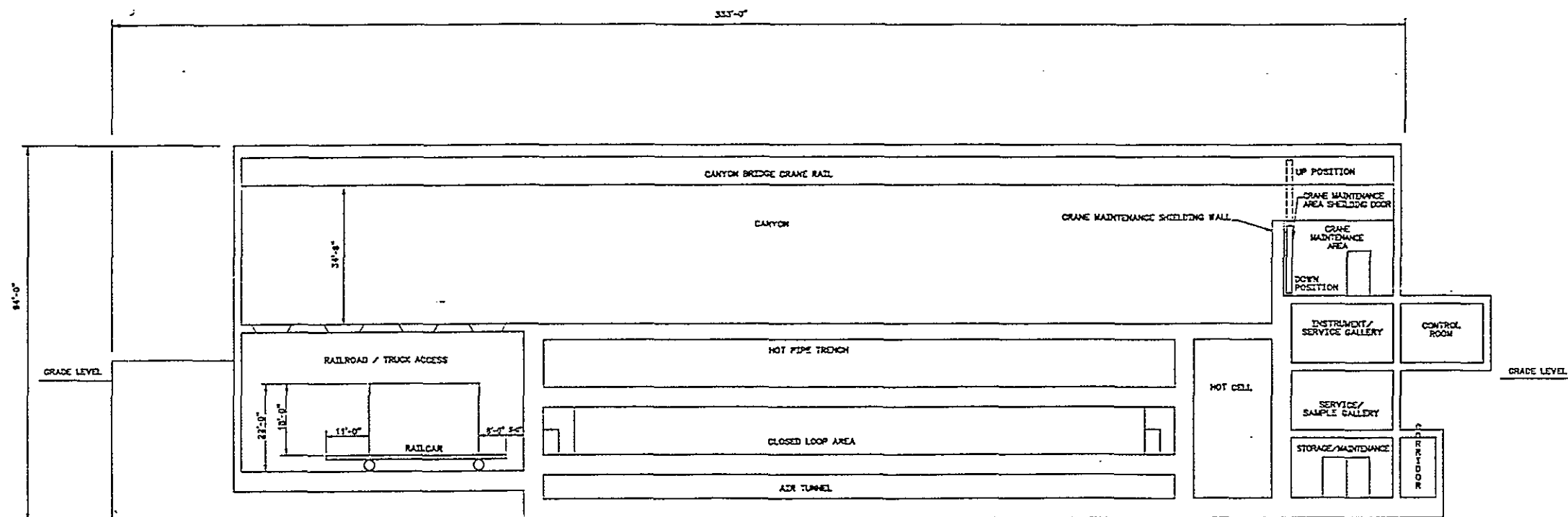


PRELIMINARY

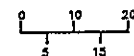
NOT APPROVED FOR CONSTRUCTION

U.S. DEPARTMENT OF ENERGY RICHLAND OPERATIONS OFFICE	
KAISER ENGINEERS HANFORD COMPANY	
PRE-TREATMENT FACILITY PLAN (+) 4'-0" (OFFICE COMPLEX)	
PROJECT NO.	HWYP PRE-TREATMENT FACILITY
PROJ. NO.	EX-1368
DATE	244800
BY	SA OREGO
CHECKED BY	JO CAMPBELL
DATE	4/24
ES-800-03B	1 1 0

BY DATE	BY DATE	REV	DESCRIPTION	REV
APPROVAL	REV APPROVAL	DATE	REVISIONS	
NAME	TITLE	REFERENCES		
NUMBER	DRAWING TRACEABILITY LIST	NEXT USED ON		



BUILDING ELEVATION - SECTION B
SCALE: $\frac{1}{8}'' = 1'-0''$

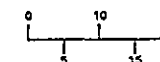


PRELIMINARY

NOT APPROVED FOR CONSTRUCTION

U.S. DEPARTMENT OF ENERGY OPERATIONS OFFICE KAISER ENGINEERS HANFORD COMPANY	
PRE-TREATMENT FACILITY ELEVATION B	
PROJECT TITLE HWY PRE-TREATMENT FACILITY	
PROJECT NO. ER-1389	INDEX 244800
DRAWN BY SA CRIGO 3/78 CHECKED BY RO CAMPBELL 3/78 ES-800-06A	

[illegible]



SCALE: 1/8"=1'-0"

IN SD CAMPBELL	DA	ES	000	077	1	0
2	MEMORANDUM		1	ESBOCA		C 03/12/8
		1100L07AC00				

[illegible]

PRETREATMENT

	AREA						VOLUME
(-) 30'-0" Level							
. Stairwell	32	x	16	512	x	60	30,720
. Stairwell	10	x	21	210	x	60	12,600
. Stairwell	10	x	21	210	x	60	12,600
. Stairwell	10	x	21	210	x	60	12,600
. Stairwell	10	x	21	210	x	60	12,600
. Remote HEPA Crane Maint Area	42	x	23	966	x	15	14,490
. Suit Up Area	25	x	23	575	x	15	8,625
. Remote HEPA Filter Test/Monitor	44	x	15	660	x	15	9,900
. Filter Change Out Cont Room	18	x	11	198	x	15	2,970
. Air Lock/Corridor	70	x	11	770	x	15	11,550
. FECA Operating Area	34	x	25	850	x	15	12,750
. FECA Cell	39	x	25	975	x	15	14,625
. Remote HEPA Filter Area	47	x	42	1,974	x	15	29,610
.	11	x	15	165	x	15	2,475
. Hot Shop/Air Lock/Corridor	312	x	25	7,800	x	15	117,000
. Storage Maintenance	312	x	25	7,800	x	15	117,000
. Corridor/Air Lock	72	x	25	1,800	x	15	27,000
. Narrow Corridor	100	x	10	1,000	x	15	15,000
. Elevator	25	x	20	500	x	45	22,500
. Cell A	224	x	20	4,480	x	40	179,200
. Cell B	224	x	20	4,480	x	40	179,200
. Cell C	25	x	20	500	x	40	20,000
.	25	x	20	500	x	40	20,000
.	62	x	20	1,240	x	40	49,600
. Air Tunnel	252	x	12	3,024	x	6	18,144
. Closed Loop Area	252	x	12	3,024	x	12	36,288
Subtotal				44,633	FT ²		989,047 FT ³
(-) 13'-0" Level							
. Primary/Secondary Steam Gen	47	x	67	3,149	x	15	47,235
	34	x	23	782	x	15	11,730
. Rail/Truck Access	74	x	25	1,850	x	31	57,350
. Sample Gallery	312	x	25	7,800	x	15	117,000
. Sample Gallery	312	x	25	7,800	x	15	117,000
. Sample Gallery	72	x	25	1,800	x	15	27,000
. Laboratory	62	x	60	3,720	x	15	55,800
. Elevator	25	x	20	500	x	45	22,500
. Elevator	32	x	16	512	x	45	23,040
. FECA Operating Area	34	x	25	850	x	15	12,750
. FECA Cell	26	x	37	962	x	15	14,430
. Hot Pipe Trench	12	x	250	3,000	x	12	36,000
. Remote HEPA Filter Room	40	x	32	1,280	x	15	19,200
Subtotal				34,005	FT ²		561,035 FT ³

(+) 4'-0" Level

. FECA Cell	26	x	37	962	x	15	14,430
. HVAC Room	67	x	47	3,149	x	15	47,235
. FECA Operating Area	34	x	25	850	x	15	12,750
. Instm/Service Gallery	312	x	25	7,800	x	15	117,000
. Instm/Service Gallery	312	x	25	7,800	x	15	117,000
. Instm/Service Gallery	72	x	25	1,800	x	15	27,000
. Control Room	128	x	21	2,688	x	15	40,320
. Office Complex	128	x	50	6,400	x	15	96,000
. HVAC Exhaust Room	90	x	60	5,400	x	15	81,000
. HVAC Filter Room	85	x	60	5,100	x	15	76,500
. Mechanical Room	62	x	60	3,720	x	15	55,800
. Elect/Switchgear Room	62	x	21	1,302	x	15	19,530
. Emergency Generator	48	x	35	1,680	x	15	25,200
Subtotal				48,651	FT ²		729,765 FT ³

(+) 21'-0" Level

. Chem/Make Up Storage	312	x	25	7,800	x	15	117,000
. Chem/Make Up Storage	312	x	25	7,800	x	15	117,000
. Crane Maintenance	64	x	20	1,280	x	35	44,800
. Canyon Deck	360	x	62	22,320	x	43	959,760
Subtotal				39,200	FT ²		1,238,560 FT ³

TOTALS

(-) 30'-0" Level	44,633		989,047	
(-) 13'-0" Level	34,005		561,035	
(+) 4'-0" Level	48,651		729,765	
(+) 21'-0" Level	<u>39,200</u>		<u>1,238,560</u>	
TOTAL	166,489	FT ²	3,518,407	(3.5m FT ³)

RDC:tst

KAISER ENGINEERS HANFORD
WESTINGHOUSE HANFORD COMPANY
JOB NO. ER1369

** KAISER ENGINEERS INTERACTIVE ESTIMATING **
PRETREATMENT FACILITY

PAGE 1 OF 6
DATE 02/20/89 04:01
BY F.C. DAY

KEHR01 - PROJECT COST SUMMARY

COST CODE =====	DESCRIPTION =====	ESCALATED TOTAL COST =====	CONTINGENCY % =====	TOTAL =====	TOTAL DOLLARS =====
000	ENGINEERING	97,510,000	35	34,130,000	131,640,000
460	IMPROVEMENTS TO LAND	5,430,000	35	1,900,000	7,330,000
501	BUILDINGS	314,860,000	35	110,200,000	425,060,000
	(ADJUSTED TO MEET DOE 5100.4)			-30,000	-30,000
				=====	=====
	PROJECT TOTAL	417,800,000	35	146,200,000	564,000,000

TYPE OF
ESTIMATE

ARCHITECT
ENGINEER *EDR*

OPERATING
CONTRACTOR

REMARKS:

CHECK

(ROUNDED/ADJUSTED TO THE NEAREST " 10,000 / 100,000 " - PERCENTAGES NOT RECALCULATED TO REFLECT ROUNDING)

KAISER ENGINEERS HANFORD
WESTINGHOUSE HANFORD COMPANY
JOB NO. ER1369

** KAISER ENGINEERS INTERACTIVE ESTIMATING **
PRETREATMENT FACILITY
PARAMETRIC - ROUGH ORDER OF MAGNITUDE
KEHR02 - WORK BREAKDOWN STRUCTURE SUMMARY

PAGE 2 OF 6
DATE 02/20/89 04:01
BY F.C. DAY

WBS	DESCRIPTION	ESTIMATE SUB TOTAL	OTHER INDIRECTS	SUB TOTAL	ESCALATION % TOTAL	SUB TOTAL	CONTINGENCY % TOTAL	TOTAL DOLLARS
=====	=====	=====	=====	=====	=====	=====	=====	=====
110000	DEFINITIVE DESIGN	36760900	0	36760900	38.75 14244849	51005749	35 17852012	68857761
120000	ENGINEERING/INSPECTION	14406300	0	14406300	68.25 9832300	24238600	35 8483510	32722110
130000	ENGINEERING MANAGEMENT	13909500	0	13909500	60.05 8352655	22262155	35 7791754	30053909
	SUBTOTAL 1 ENGINEERING	65076700	0	65076700	49.83 32429803	97506503	35 34127276	131633779
320000	FP CONSTRUCTION	165589800	14918082	180507882	62.50 *****	293325308	35 *****	395989166
330000	WHC PROJECT MANAGEMENT	16848700	0	16848700	60.05 10117644	26966344	35 9438221	36404565
	SUBTOTAL 3 CONSTRUCTION	182438500	14918082	197356582	62.29 *****	320291653	35 *****	432393731
=====								
PROJECT TOTAL		247,515,200	14,918,082	262,433,282	59.20 155,364,874	417,798,156	35 146,229,355	564,027,510

KAISER ENGINEERS HANFORD
WESTINGHOUSE HANFORD COMPANY
JOB NO. ER1369

** KAISER ENGINEERS INTERACTIVE ESTIMATING **
PRETREATMENT FACILITY
PARAMETRIC - ROUGH ORDER OF MAGNITUDE
KEHR04 - COST CODE ACCOUNT SUMMARY

PAGE 4 OF 6
DATE 02/20/89 04:01
BY F.C. DAY

COST CODE	WBS DESCRIPTION	ESTIMATE SUB TOTAL	OTHER INDIRECTS	SUB TOTAL	ESCALATION % TOTAL	SUB TOTAL	CONTINGENCY % TOTAL	TOTAL DOLLARS
000 ENGINEERING								
110000	DEFINITIVE DESIGN	36760900	0	36760900	38.75 14244849	51005749	35 17852012	68857761
120000	ENGINEERING/INSPECTION	14406300	0	14406300	68.25 9832300	24238600	35 8483510	32722110
130000	ENGINEERING MANAGEMENT	13909500	0	13909500	60.05 8352655	22262155	35 7791754	30053909
TOTAL 000 ENGINEERING		65076700	0	65076700	49.83 32429803	97506503	35 34127276	131633779
460 IMPROVEMENTS TO LAND								
320000	FP CONSTRUCTION	3064200	275778	3339978	62.50 2087486	5427464	35 1899612	7327077
TOTAL 460 IMPROVEMENTS TO LAND		3064200	275778	3339978	62.50 2087486	5427464	35 1899612	7327077
501 BUILDINGS								
320000	FP CONSTRUCTION	162525600	14642304	177167904	62.50 *****	287897844	35 *****	388662089
330000	WHC PROJECT MANAGEMENT	16848700	0	16848700	60.05 10117644	26966344	35 9438221	36404565
TOTAL 501 BUILDINGS		179374300	14642304	194016604	62.29 *****	314864188	35 *****	425066654
=====								
PROJECT TOTAL		247,515,200	14,918,082	262,433,282	59.20 155,364,874	*****	35 *****	564,027,510

KAISER ENGINEERS HANFORD
WESTINGHOUSE HANFORD COMPANY
JOB NO. ER1369

**** KAISER ENGINEERS INTERACTIVE ESTIMATING ****
PRETREATMENT FACILITY
PARAMETRIC - ROUGH ORDER OF MAGNITUDE
KEH05 - ESTIMATE SUMMARY BY CSI DIVISION

PAGE 5 OF 6
DATE 02/20/89 04:01
BY F.C. DAY

CSI DIV	DESCRIPTION	ESTIMATE SUB TOTAL	OTHER INDIRECTS	SUB TOTAL	ESCALATION % TOTAL	SUB TOTAL	CONTINGENCY % TOTAL	TOTAL DOLLARS
ENGINEERING								
	ENGINEERING	65076700	0	65076700	49.83 32429803	97506503	35 34127276	131633779
	TOTAL ENGINEERING	65076700	0	65076700	49.83 32429803	97506503	35 34127276	131633779
CONSTRUCTION								
02	SITWORK	3064200	275778	3339978	62.50 2087486	5427464	35 1899612	7327077
03	CONCRETE	65676700	5910903	71587603	62.50 44742252	116329855	35 40715449	157045304
15	MECHANICAL	96848900	8731401	105580301	62.50 65987688	171567989	35 60048796	231616785
20	BURNOUT	16848700	0	16848700	60.05 10117644	26966344	35 9438221	36404565
	TOTAL CONSTRUCTION	182438500	14918082	197356582	62.29 *****	320291653	35 *****	432393731
PROJECT TOTAL								
		247,515,200	14,918,082	262,433,282	59.20 155,364,874	*****	35 *****	564,027,510

KAISER ENGINEERS HANFORD
WESTINGHOUSE HANFORD COMPANY
JOB NO. ER1369

** KAISER ENGINEERS INTERACTIVE ESTIMATING **
PRETREATMENT FACILITY
PARAMETRIC - ROUGH ORDER OF MAGNITUDE
KEHR07 - ONSITE INDIRECT COSTS BY WBS

PAGE 6 OF 6
DATE 02/20/89 04:01
BY F.C. DAY

WBS	DESCRIPTION	ESTIMATE SUB TOTAL	CONTRACT %	ADMINISTRATION TOTAL	BID PACK PREP.	OTHER INDIRECTS	TOTAL INDIRECTS
=====	=====	=====	=====	=====	=====	=====	=====
110000	DEFINITIVE DESIGN	36760900	0.00	0	0	0	0
120000	ENGINEERING/INSPECTION	14406300	0.00	0	0	0	0
130000	ENGINEERING MANAGEMENT	13909500	0.00	0	0	0	0
320000	FP CONSTRUCTION	165589800	9.00	14903082	15000	0	14918082
330000	WHC PROJECT MANAGEMENT	16848700	0.00	0	0	0	0
=====							
PROJECT TOTAL		247,515,200		14,903,082	15,000	0	14,918,082

KAISER ENGINEERS HANFORD
WESTINGHOUSE HANFORD COMPANY
JOB NO. ER1369

**** KAISER ENGINEERS INTERACTIVE ESTIMATING ****
PRETREATMENT FACILITY
PARAMETRIC - ROUGH ORDER OF MAGNITUDE
KEHR08 - ESTIMATE DETAIL BY WBS / COST CODE

PAGE 0001
DATE 02/20/89 04:01
BY F.C. DAY

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB- CONTRACT	EQUIP- MENT	OH&P / B & I	TOTAL DOLLARS
110000	DEFINITIVE DESIGN										
110000.00	TECHNICAL SERVICES										
110000.0000102	DEFINITIVE DESIGN	000	1 LS	0	0	0	0	36760900	0	0	36760900
SUBTOTAL TECHNICAL SERVICES				0	0	0	0	36,760,900	0	0	36,760,900
TOTAL COST CODE 00000 WBS 110000				0	0	0	0	36,760,900	0	0	36,760,900
(ESCALATION 38.75% - CONTINGENCY 35.00%)											
TOTAL WBS 110000 DEFINITIVE DESIGN				0	0	0	0	36,760,900	0	0	36,760,900

KAISER ENGINEERS HANFORD
WESTINGHOUSE HANFORD COMPANY
JOB NO. ER1369

** KAISER ENGINEERS INTERACTIVE ESTIMATING **
PRETREATMENT FACILITY
PARAMETRIC - ROUGH ORDER OF MAGNITUDE
KEHRO8 - ESTIMATE DETAIL BY WBS / COST CODE

PAGE 0002
DATE 02/20/89 04:01
BY F.C. DAY

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB- CONTRACT	EQUIP- MENT	OH&P / B & I	TOTAL DOLLARS
120000	ENGINEERING/INSPECTION										
120000.00	TECHNICAL SERVICES										
120000.0000100	ENGINEERING/INSPECTION	000	1 LS	0	0	0	0	14406300	0	0	14406300
SUBTOTAL TECHNICAL SERVICES				0	0	0	14,406,300	0	0	14,406,300	
TOTAL COST CODE 00000 WBS 120000				0	0	0	14,406,300	0	0	14,406,300	
(ESCALATION 68.25% - CONTINGENCY 35.00%)											
TOTAL WBS 120000 ENGINEERING/INSPECTION				0	0	0	14,406,300	0	0	14,406,300	

KAISER ENGINEERS HANFORD
WESTINGHOUSE HANFORD COMPANY
JOB NO. ER1369

** KAISER ENGINEERS INTERACTIVE ESTIMATING **
PRETREATMENT FACILITY
PARAMETRIC - ROUGH ORDER OF MAGNITUDE
KEHRO8 - ESTIMATE DETAIL BY WBS / COST CODE

PAGE 0003
DATE 02/20/89 04:01
BY F.C. DAY

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	HANHOOURS	LABOR	EQUIP USAGE	MATERIAL	SUB- CONTRACT	EQUIP- MENT	OH&P / B & I	TOTAL DOLLARS
130000	ENGINEERING MANAGEMENT										
130000.00	TECHNICAL SERVICES										
130000.0000100	ENGINEERING MANAGMENT	000	1 LS	0	0	0	0	13909500	0	0	13909500
SUBTOTAL TECHNICAL SERVICES				0	0	0	13,909,500	0	0	13,909,500	
TOTAL COST CODE 00000 WBS 130000				0	0	0	13,909,500	0	0	13,909,500	
(ESCALATION 60.05% - CONTINGENCY 35.00%)											
TOTAL WBS 130000 ENGINEERING MANAGEMENT				0	0	0	13,909,500	0	0	13,909,500	

PAGE 0004
DATE 02/20/89 04:01
BY F.C. DAY

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB- CONTRACT	EQUIP- MENT	OH&P / B & I	TOTAL DOLLARS
=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====	=====
320000	FP CONSTRUCTION										
320000.02	SITWORK										
320000.0200100	EXCAVATION - INCLS. THE COST FOR CLEARING & GRUBBING OF SITE, EXCAVATION AND	460	1 LS	0	0	0	0	0	0	0	0
320000.0200102	BACKFILL FOR THE BUILDING	460	1 LS	0	0	0	0	3064200	0	0	3064200
SUBTOTAL SITWORK				0	0	0	0	3,064,200	0	0	3,064,200
TOTAL COST CODE 46002 WBS 320000				0	0	0	0	3,064,200	0	0	3,064,200
(ESCALATION 62.50% - CONTINGENCY 35.00%)											
320000.03	CONCRETE										
320000.0300100	STRUCTURE COST - INCLS. THE EXTERNAL STRUCTURE(WALL FACE S, ROOFING, CONNECTING WALLS	501	1 LS	0	0	0	0	0	0	0	0
320000.0300102	WINDOWS), SUPERSTRUCTURE, & INTERNAL STRUCTURE(WALLS, CEILINGS,FLOORS,DOORS,ETC.)	501	1 LS	0	0	0	0	65676700	0	0	65676700
SUBTOTAL CONCRETE				0	0	0	0	65,676,700	0	0	65,676,700
TOTAL COST CODE 50103 WBS 320000				0	0	0	0	65,676,700	0	0	65,676,700
(ESCALATION 62.50% - CONTINGENCY 35.00%)											

KAISER ENGINEERS HANFORD
WESTINGHOUSE HANFORD COMPANY
JOB NO. ER1369

**** KAISER ENGINEERS INTERACTIVE ESTIMATING ****
PRETREATMENT FACILITY
PARAMETRIC - ROUGH ORDER OF MAGNITUDE
KEHROB - ESTIMATE DETAIL BY WBS / COST CODE

PAGE 0005
DATE 02/20/89 04:01
BY F.C. DAY

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB- CONTRACT	EQUIP- MENT	OH&P / B & I	TOTAL DOLLARS
320000.15	MECHANICAL										
320000.1500100	HVAC - INCLS. COST FOR THE HEATING, VENTILATING, AIR CONDITIONING, & CONTROLS)	501	1 LS	0	0	0	0	15215600	0	0	15215600
320000.1500200	ELECTROMECHANICAL - INCLS. THE COST FOR ELECTRICAL, PLUMBING, PIPING, FIRE PROTECTION, MECHANICAL EQUIPMENT, & INSTRUMENTATION	501	1 LS	0	0	0	0	0	0	0	0
320000.1500202	UTILITIES - INCLS THE COST FOR RR TRACK SPUR, 10 OUTSIDE STORAGE TANKS W/CONCRETE	501	1 LS	0	0	0	0	78698300	0	0	78698300
320000.1500300	PAD AND DIKE, MECHANICAL PIPING & EQUIP., INSTRUMENTATION, & PAVING	501	1 LS	0	0	0	0	0	0	0	0
320000.1500302		501	1 LS	0	0	0	0	2935000	0	0	2935000
SUBTOTAL MECHANICAL				0	0	0	96,848,900	0	0	96,848,900	
TOTAL COST CODE 50115 WBS 320000				0	0	0	96,848,900	0	0	96,848,900	
(ESCALATION 62.50% - CONTINGENCY 35.00%)											
TOTAL WBS 320000 FP CONSTRUCTION				0	0	0	165,589,800	0	0	165,589,800	

KAISER ENGINEERS HANFORD
WESTINGHOUSE HANFORD COMPANY
JOB NO. ER1369

** KAISER ENGINEERS INTERACTIVE ESTIMATING **
PRETREATMENT FACILITY
PARAMETRIC - ROUGH ORDER OF MAGNITUDE
KEHRO8 - ESTIMATE DETAIL BY WBS / COST CODE

PAGE 0006
DATE 02/20/89 04:01
BY F.C. DAY

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB- CONTRACT	EQUIP- MENT	OH&P / B & I	TOTAL DOLLARS
330000	WHC PROJECT MANAGEMENT										
330000.20	BURNOUT										
330000.2000100	WHC PROJECT MANAGEMENT	501	1 LS	0	0	0	0	16848700	0	0	16848700
SUBTOTAL BURNOUT				0	0	0	0	16,848,700	0	0	16,848,700
TOTAL COST CODE 50120 WBS 330000				0	0	0	0	16,848,700	0	0	16,848,700

(ESCALATION 60.05% - CONTINGENCY 35.00%).

TOTAL WBS 330000 WHC PROJECT MANAGEMENT

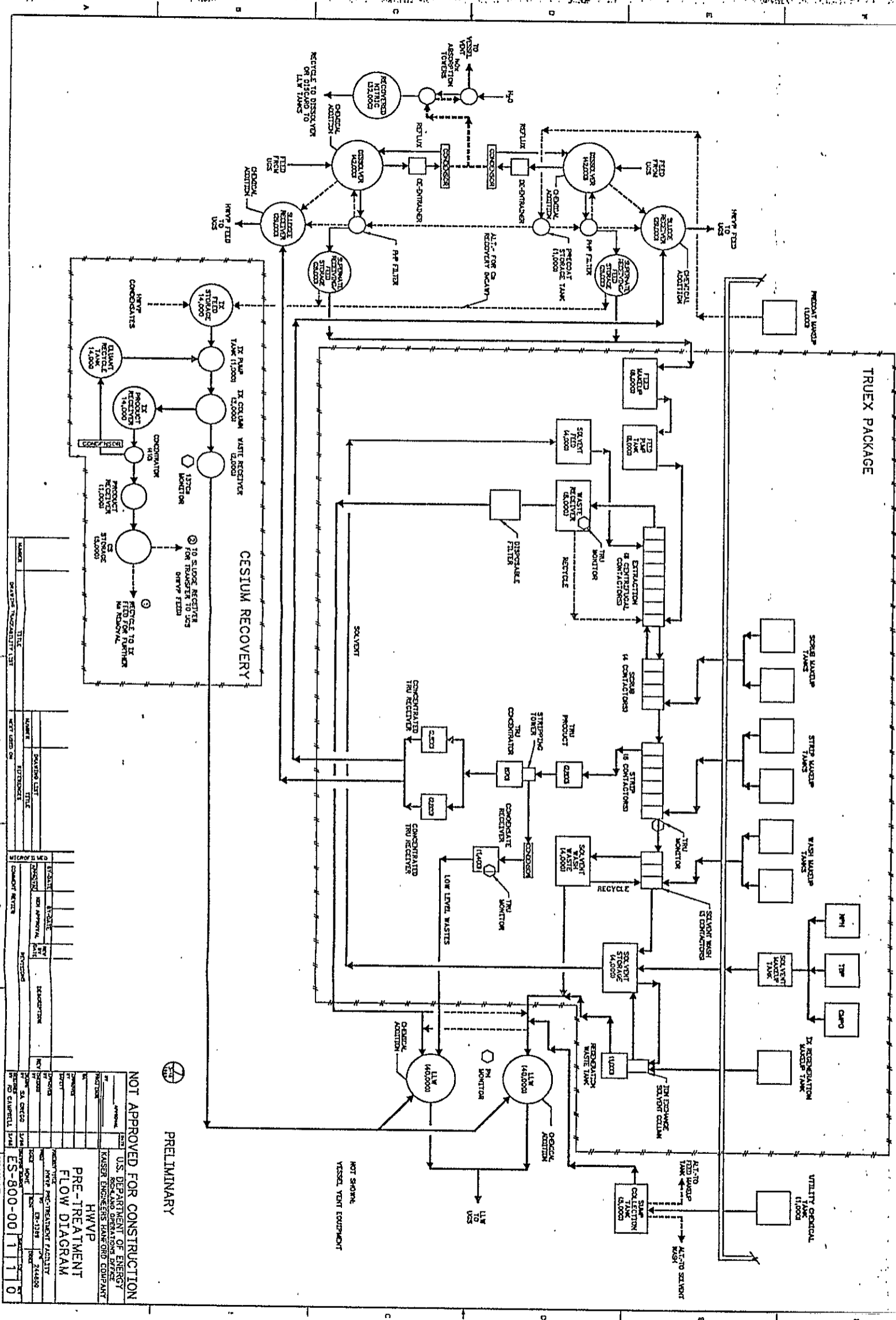
0	0	0	0	16,848,700	0	0	16,848,700
---	---	---	---	------------	---	---	------------

KAISER ENGINEERS HANFORD
WESTINGHOUSE HANFORD COMPANY
JOB NO. ER1369

** KAISER ENGINEERS INTERACTIVE ESTIMATING **
PRETREATMENT FACILITY
PARAMETRIC - ROUGH ORDER OF MAGNITUDE
KEHR08 - ESTIMATE DETAIL BY WBS / COST CODE

PAGE 0007
DATE 02/20/89 04:01
BY F.C. DAY

ACCOUNT NUMBER	DESCRIPTION	COST CODE	QUANTITY	MANHOURS	LABOR	EQUIP USAGE	MATERIAL	SUB- CONTRACT	EQUIP- MENT	OH&P / B & I	TOTAL DOLLARS
=====											
REPORT TOTAL				0	0	0	247,515,200 0		0	0	247,515,200





PRELIMINARY

NOT APPROVED FOR CONSTRUCTION

U.S. DEPARTMENT OF ENERGY
RISK AND OPERATIONS OFFICE

KAISER ENGINEERS HANFORD COMPANY

PRE-TREATMENT
FACILITY

PLAN (+) 4'-0"

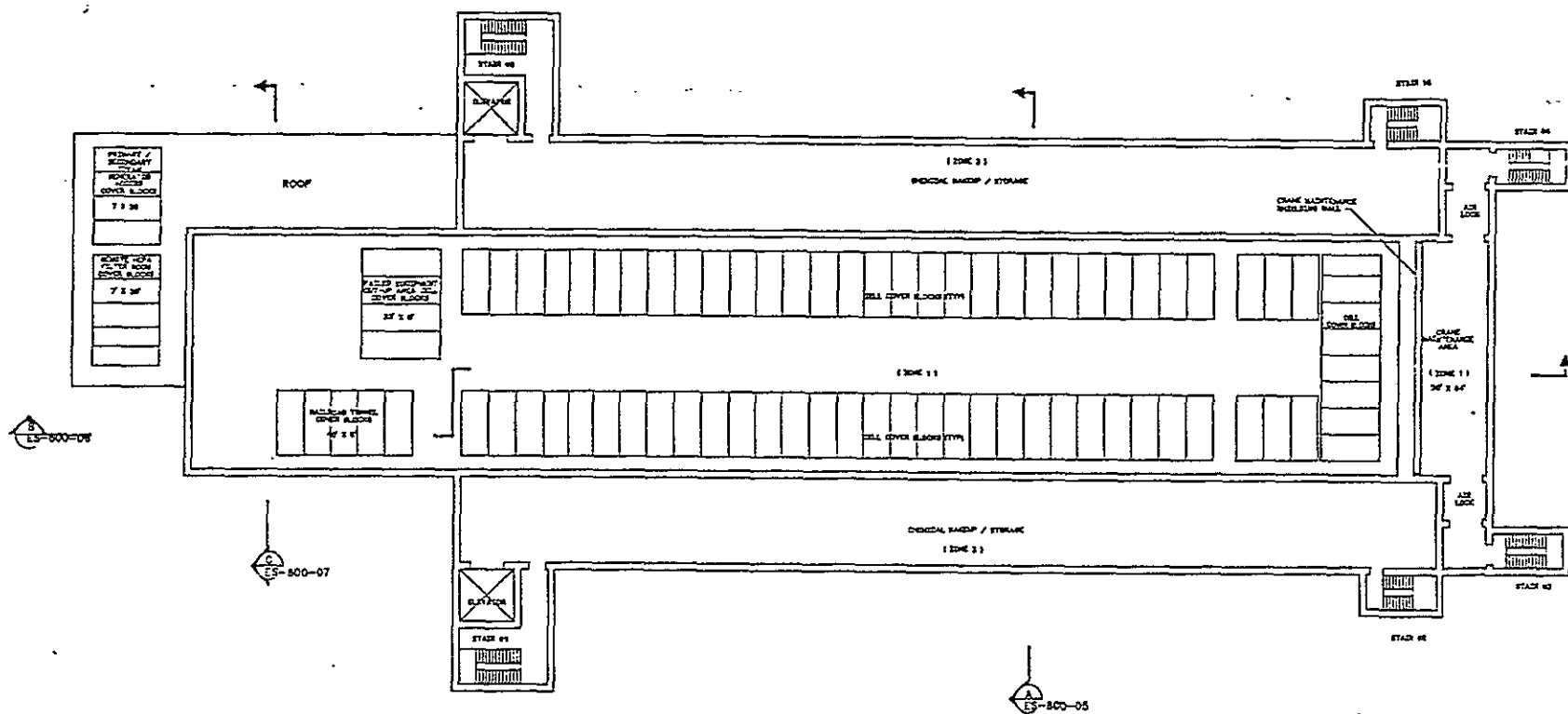
PROJECT TYPE	
HWVP PRE-TREATMENT FACILITY	
NO.	04-0000

NAME	AGE	DOB

ES-800-03 1 1 0

17C00022000

[illegible]



PLAN VIEW #4 (+121'-0")



PRELIMINARY

NOT APPROVED FOR CONSTRUCTION

U.S. DEPARTMENT OF ENERGY
RICHLAND OPERATIONS OFFICE
KAISER ENGINEERS HANFORD COMPANY

PRE-TREATMENT
FACILITY
PLAN (+121'-0")

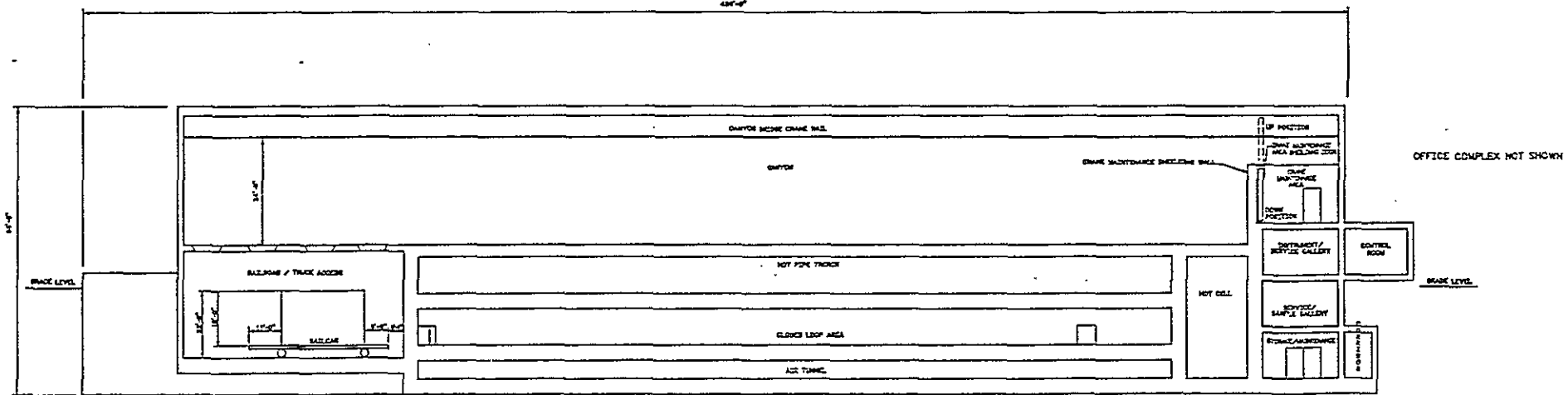
PROJECT TITLE
HWPP PRE-TREATMENT FACILITY
PROJECT NO.
CR-1349
DATE
244800

DESIGNED BY
SA DREGG
CHECKED BY
RD CAMPBELL
DATE
2/74

ES-800-04 1 1 0

BY-DATE	BY-DATE	REV	DESCRIPTION
APPROVAL	NON APPROVAL	DATE	
NUMBER	TITLE	NUMBER	TITLE
REFERENCE	REFERENCE	REFERENCE	REFERENCE
COMMENT	REVIEW	REVISIONS	

NUMBER	TITLE	NUMBER	TITLE
DRAWING TRACKABILITY LIST	NEXT USED ON		



BUILDING ELEVATION - SECTION B



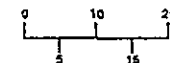
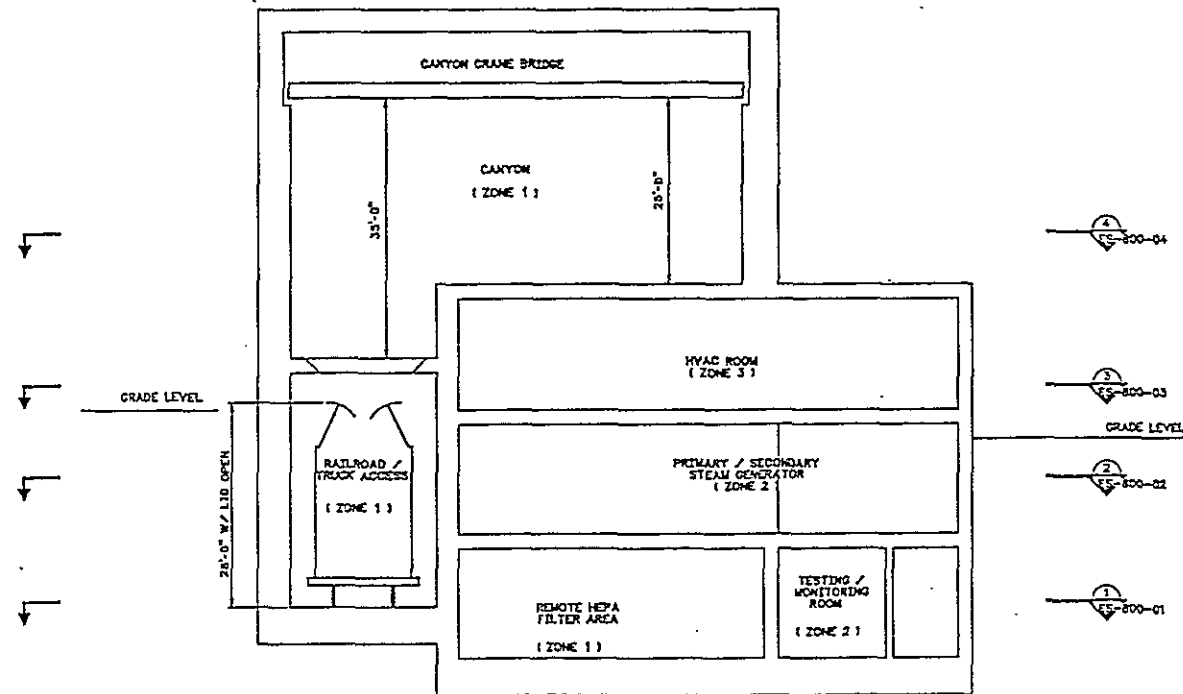
6
1/11/77

PRELIMINARY

NOT APPROVED FOR CONSTRUCTION

U.S. DEPARTMENT OF ENERGY RICHLAND OPERATIONS OFFICE KAISER ENGINEERS HANFORD COMPANY	
PRE-TREATMENT FACILITY ELEVATION B	
PROJECT TITLE: HWVP PRE-TREATMENT FACILITY	
DESIGNED BY: SA CREGG	DATE: 8/74
CHECKED BY: RD CAMPBELL	DATE: 8/74
PROJECT NO: ES-800-06	
SHEET NO: 1110	

SY-DATE	SY-DATE	REV	REVISION	REV
APPROVAL	KEY APPROVAL	DATE		
CONDUCT REVIEW				
NUMBER	TITLE	NUMBER	TITLE	NUMBER
DRAWING LIST	REFERENCES			
DRAWING TRACEABILITY LIST	NEXT USED ON			

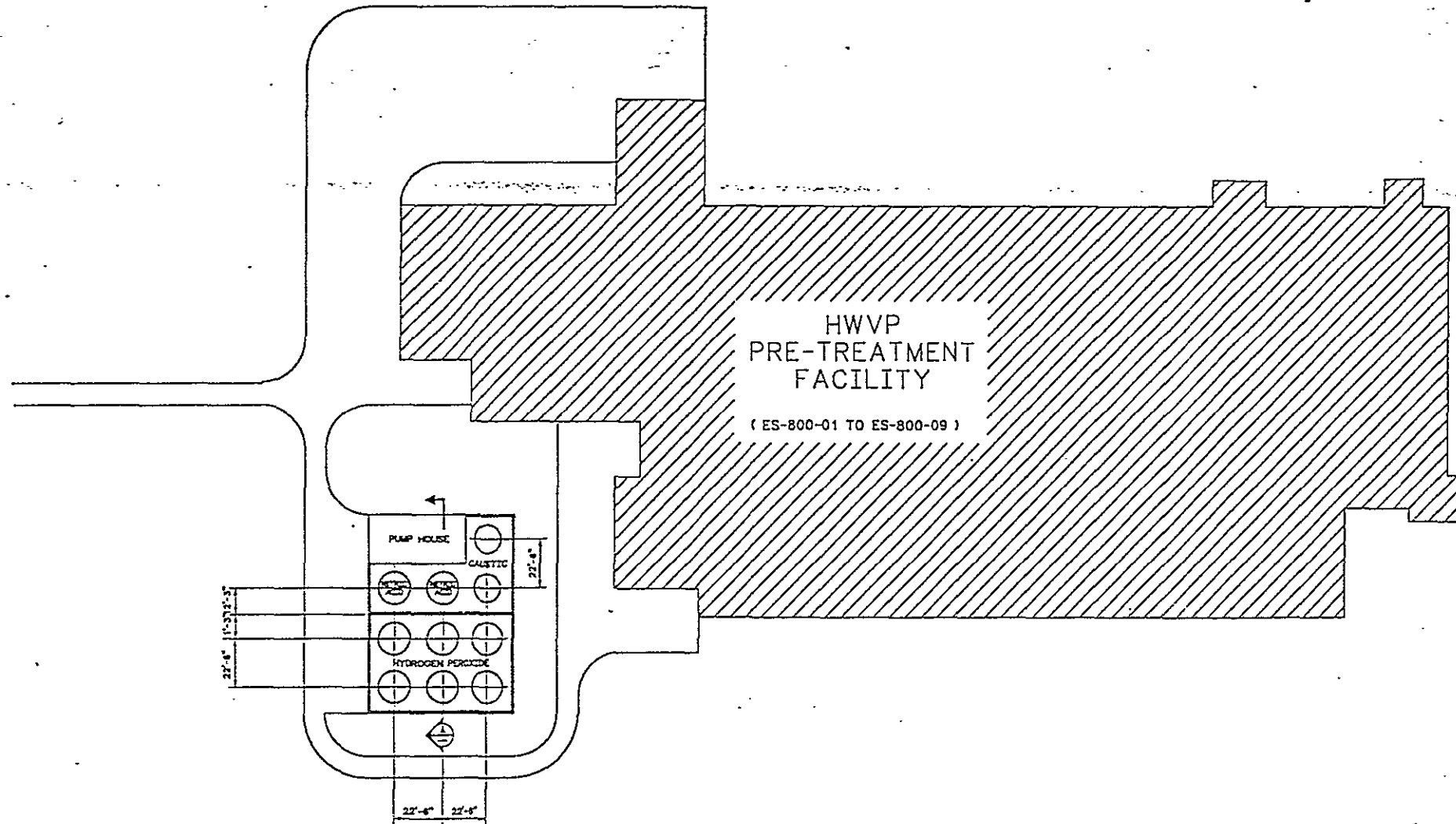


BUILDING ELEVATION - SECTION C
SCALE: 1/8"=1'-0"

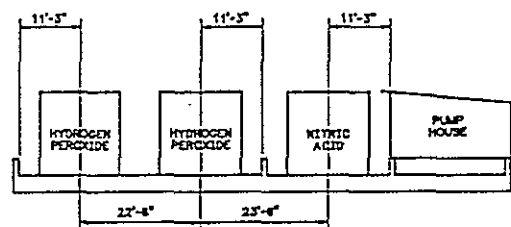
PRELIMINARY
NOT APPROVED FOR CONSTRUCTION

U.S. DEPARTMENT OF ENERGY RICHLAND OPERATIONS OFFICE KAISER ENGINEERS HANFORD COMPANY	
PRE-TREATMENT FACILITY ELEVATION C	
PROJECT TITLE HNP PRE-TREATMENT FACILITY	PROJECT NO. ER-1369
DATE 11/1/77	SCALE 1/8"=1'-0"
BY SA OREGG	CHECKED RD CAMPBELL
ES-800-07 1 1 0	

NO.	BY-DATE	BY-DATE	REV	DESCRIPTION
1	11/1/77	11/1/77	1	ISSUED FOR CONSTRUCTION
2			2	REVISED
3			3	REVISED
4			4	REVISED
5			5	REVISED
6			6	REVISED
7			7	REVISED
8			8	REVISED
9			9	REVISED
10			10	REVISED



PLAN
NTS



SECTION A-A
NTS

VESSEL	SIZE	QTY.
HYDROGEN PEROXIDE	150 X 15H	6
SODIUM HYDROXIDE (CAUSTIC)	150 X 15H	2
NITRIC ACID	150 X 15H	2

DRAWING LIST		BY DATE		BY DATE		REV DATE		DESCRIPTION		REV DATE		REVISIONS	
NUMBER	TITLE	NUMBER	DATE	NUMBER	DATE	NUMBER	DATE	NUMBER	DATE	NUMBER	DATE	NUMBER	DATE
DRAWING TRACKING LIST		ACCT USED ON		COMMENT REVIEW									

PRELIMINARY

NOT APPROVED FOR CONSTRUCTION

U.S. DEPARTMENT OF ENERGY
RICHMOND OPERATIONS OFFICE
KAISER ENGINEERS HANFORD COMPANY

PRE-TREATMENT FACILITY
COLD CHEMICAL SUPPLY AREA

HWVP PRE-TREATMENT FACILITY

NO SCALE

SA DREGG 3/84

RD CAMPBELL 3/84

ES-800-08 1 1 10

PFM BUILDING

			AREA			VOLUME	
Plan EL 79'-0"							
. Elevator	24	x 14	336	x	74	24,864	
. Elev Equip Room	22	x 10	220	x	25	5,500	
. Operating Gallery	148	x 17	2,516	x	22	55,352	
.	54	x 17	918	x	25	22,950	
.	63	x 17	1,071	x	28	29,988	
.	30	x 12	360	x	28	10,080	
. Storage Room	10	x 10	100	x	22	2,200	
. Operating Gallery	104	x 14	1,456	x	22	32,032	
. Suit-Up Room	10	x 12	120	x	22	2,640	
.	8	x 14	112	x	22	2,464	
. Crane Maint/Container Storage	25	x 15	375	x	36	13,500	
. Assay Room	15	x 10	150	x	14	2,100	
. Waste Loadout	25	x 15	375	x	36	13,500	
.	15	x 10	150	x	18	2,700	
. Waste Pkg Cell	39	x 15	585	x	18	10,530	
. Fuel Transfer Canal	52	x 10	520	x	28	14,560	
.	10	x 12	120	x	4	480	
. Storage Pit	15	x 6	90	x	12	1,080	
. Cask Unloading Pool	10	x 9	90	x	52	4,680	
. Pool Filter Basin	10	x 5	50	x	17	850	
. Testing & Decon Pit	10	x 10	100	x	25	2,500	
. Surge Pool	10	x 7	70	x	18	1,260	
. FFTF Fuel Storage Pool	32	x 9	288	x	32	9,216	
. Liquid Waste Collect Room	23	x 36	828	x	34	28,152	
.	18	x 30	540	x	34	18,360	
. Pool Pump Room	24	x 12	288	x	12	3,456	
. Suit-Up Room	10	x 14	140	x	10	1,400	
. Air Lock	10	x 12	120	x	10	1,200	
. Shear Dissolver Cell/Chem Process Cell	148	x 20	2,960	x	78	230,880	
. Failed Equip Cut-Up Area	33	x 20	660	x	78	51,480	
. Hot Pipe Trench	150	x 8	1,200	x	20	24,000	
. Operating Gallery	117	x 7	819	x	22	18,018	
.	16	x 7	112	x	22	2,464	
. Remote HEPA Filter Room	60	x 20	1,200	x	26	31,200	
.	10	x 5	50	x	26	1,300	
. Maintenance Area	10	x 19	190	x	26	4,940	
. Suit-Up Room	14	x 11	154	x	8	1,232	
. Air Lock	22	x 7	154	x	8	1,232	
. Remote HEPA Filter Testing/Monitoring Room	62	x 6	372	x	8	2,976	
. Corridor	71	x 7	497	x	8	3,976	
. Mezzanine	82	x 14	1,148	x	18	20,664	
. Filter Change-Out Control Room	12	x 7	84	x	8	672	
Subtotal			21,688	FT ²		712,628	FT ³

PLAN EL 102'-0"

				<u>AREA</u>		<u>VOLUME</u>
. Mechanical Room	32	x	28	896	x	62 55,552
. Mechanical Room	32	x	42	1,344	x	20 26,880
. Air Lock	24	x	8	192	x	20 3,840
. Mechanical Room	59	x	24	1,416	x	40 56,640
. Corridor	75	x	13	975	x	19 18,525
. Exhaust HEPA Filter Room	62	x	70	4,340	x	39 169,260
. Corridor	5	x	46	230	x	19 4,370
. Maintenance	57	x	13	741	x	19 14,079
	48	x	15	720	x	19 13,680
. Manipulator Room	33	x	56	1,848	x	18 33,264
. Exit Enclosure	12	x	8	96	x	12 1,152
. Storage Room	19	x	20	380	x	19 7,220
. Steam Letdown Room	29	x	11	319	x	19 6,061
. Mechanical Room	19	x	24	456	x	20 9,120
. Transfer Dock	32	x	36	1,152	x	20 23,040
. Mechanical Room	50	x	18	900	x	21 18,900
. Emergency Generator #1	29	x	21	609	x	22 13,398
. Emergency Generator #2	28	x	21	588	x	22 12,936
. Emergency Generator #2	16	x	24	384	x	20 7,680
. Main Electrical Room	48	x	36	1,728	x	19 32,832
. Battery Room	50	x	19	950	x	10 9,500
. Cold Chemical Make-Up	34	x	38	1,292	x	21 27,132
. Mechanical Room	32	x	38	1,216	x	21 25,536
. Corridor	26	x	10	260	x	18 4,680
. SDPR Cold Chemical Make-Up Room	18	x	57	1,026	x	28 28,728
. Transformer Yard	78	x	26	2,028	x	28 56,784
. Loading Dock	14	x	22	308	x	18 5,544
. Loading Dock	57	x	35	1,995	x	18 35,910
. Personnel Decon	18	x	16	288	x	19 5,472
. Vestibule & Staging Area	22	x	26	572	x	18 10,296
. Decon Room	13	x	7	91	x	10 910
. Access Corridor	8	x	13	104	x	18 1,872
. Office	12	x	18	216	x	18 3,888
. Instrument Repair Room	28	x	17	476	x	18 8,568
. Receiving Area Zone	36	x	23	828	x	18 14,904
. RPT Count Zone	11	x	16	176	x	9 1,584
. Communication Equipment Room	7	x	17	119	x	9 1,071
. RPT Office	14	x	18	252	x	9 2,268
. Storage Room	28	x	17	476	x	9 4,284
. 217 & 215	11	x	26	286	x	18 5,148
. Fuel Disassembly Cell	72	x	20	1,440	x	21 30,240
. Operating Gallery	281	x	18	5,058	x	20 101,160
. Fuel Transfer Canal	73	x	23	1,679	x	20 33,580
. Air Lock	32	x	60	1,920	x	28 53,760
. 284 & 250	64	x	7	448	x	7 3,136
. Sample Cave	50	x	6	300	x	7 2,100
. 257 & 258	40	x	11	440	x	7 3,080
. Low Level Waste Storage	18	x	71	1,278	x	62 79,236
. Exit Closure	8	x	19	152	x	12 1,824
. Receiving & Shipping	62	x	74	4,588	x	61 279,868
. Mechanical Room	53	x	22	1,166	x	20 23,320
. Cask Washdown	53	x	76	4,028	x	32 128,896

				AREA			VOLUME
. Chemical Waste Loadout Area	18	x	25	450	x	32	14,400
. Truck Air Lock	68	x	21	1,428	x	24	34,272
. Air Lock	11	x	9	99	x	11	1,089
Subtotal				56,747	FT ²		1,572,469 FT ³

PLAN EL 124'-0"

. Mechanical Room	78	x	42	3,276	x	20	65,520
. Vestibule	34	x	24	816	x	20	16,320
. Computer Room	18	x	24	432	x	9	3,888
. HVAC LPU Room	16	x	19	304	x	9	2,736
. Emergency Panel Room	16	x	24	384	x	9	3,456
. Corridor	12	x	32	384	x	7	2,688
. Operating Gallery	31	x	14	434	x	30	13,020
. Warm Maintenance Room	35	x	20	700	x	14	9,800
. Air Lock	6	x	12	72	x	14	1,008
. Corridor	74	x	16	1,184	x	29	34,336
. Exhaust HEPA Filter Mezzanine	96	x	48	4,608	x	21	96,768
. Corridor	16	x	56	896	x	19	17,024
.	255	x	10	2,550	x	20	51,000
.	224	x	7	1,568	x	7	10,976
.	15	x	7	105	x	20	2,100
. Air Lock	12	x	10	120	x	12	1,440
. Jet Gang Value/Instrument Room	221	x	10	2,210	x	12	26,520
. Jet Gang Valve	80	x	7	560	x	12	6,720
. Air Lock	12	x	6	72	x	12	864
. Mechanical Room	98	x	48	4,704	x	24	112,896
. Stairway 7	48	x	4	192	x	30	5,760
. Air Lock	8	x	10	80	x	12	960
. Air Lock	12	x	7	84	x	12	1,008
. Crane Maintenance	51	x	24	1,224	x	20	24,480
. Corridor	242	x	9	2,178	x	20	43,560
. Stairway 2	8	x	16	128	x	26	3,328
. Stairway 1	8	x	18	144	x	52	7,488
. Stairway 6	25	x	8	200	x	70	14,000
. Stairway 5	22	x	8	176	x	32	5,632
. Stairway 4	4	x	18	72	x	20	1,440
. Decon Operations Room	9	x	30	270	x	12	3,240
. Decon Operations Room	16	x	30	480	x	12	5,760
. Decon Operations Room	19	x	30	570	x	32	18,240
. Transfer Room	25	x	12	300	x	10	3,000
. Suit-Up Room	9	x	11	99	x	10	990
. Corridor	18	x	7	126	x	10	1,260
. Corridor	10	x	7	70	x	10	700
. Stairway 13	18	x	8	144	x	20	2,880
Subtotal				31,916	FT ²		622,806 FT ³

Subtotals

. 79'-0"	21,688	712,628
. 102'-0"	56,747	1,572,469
. 124'-0"	31,916	622,806
TOTALS	<u>116,014</u> FT ²	<u>2,907,903</u> +FT ³ (2.9m FT ³)

RWM:tst

PFM BUILDING

(CONCRETE VOLUME)

EL 79'-0"	14,922.5 YD ³
EL 102'-0"	11,050.7 YD ³
EL 124'-0"	<u>7,765.0</u> YD ³
TOTAL	33,738.2 YD ³

RWM:tst